

Concept and Development of Disaster Prevention Fashion

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Abstract—Now that tsunamis, floods, and other disasters are becoming more frequent due to climate change, it is desirable that the clothes we usually wear have disaster prevention functions. This paper proposes the concept of disaster prevention fashion and describes its production process.

Keywords—disaster prevention, digital art, digital printing technology, disaster prevention fashion

I. INTRODUCTION

In a country like Japan, which is known as a disaster-prone country, it is important to be prepared for disasters daily and ready to cope even if disaster strikes. One way to achieve this is to add disaster prevention functions to clothing. One example of clothing with disaster prevention functions is the uniforms worn by firefighters and others. However, these disaster-prevention clothes have not been considered fashionable enough to be worn by the general public. There have not been many concrete efforts to combine everyday fashion and disaster prevention functions.

In this paper, we present the basic concept of disaster prevention fashion, which combines fashion for daily wear and disaster prevention functions, as well as specific examples of its development.

II. DISASTER PREVENTION FUNCTION



Fig. 1. The basic type of firefighting uniform made of Aramid fiber. (<https://www.teisen.co.jp/product/552/>)

Fire resistance, water resistance, and toughness are some disaster prevention functions that disaster prevention fashion

should possess. Aramid is a fiber with these properties. Aramid is a synthetic fiber with high heat resistance, water resistance, and resistance to cutting and abrasion. It is used in firefighters' fireproof garments and bulletproof vests worn by police and other personnel.

Figure 1 shows examples of flame-retardant active-duty uniforms worn by firefighters. Our research uses fabrics made from Aramid fiber for disaster prevention fashion. This fabric has a good affinity with digital textile printing technology, making it suitable for this study.

III. DIGITAL TEXTILE PRINTING TECHNOLOGY

Digital textile printing [1] is a technology that prints various designs and images on fabric. Various techniques for printing high-quality images on paper have been developed in the past, and the development of digital textile printing technology was made possible by developing inks and other materials suitable for textiles, which enabled printing on fabrics.

IV. SOUND OF IKEBANA: DIGITAL ART AS DISASTER PREVENTION FASHION DESIGN

Digital art created by Naoko Tosa, one of the authors, is used as a design for disaster prevention fashion. Tosa found that by applying sound vibrations to a fluid such as paint and photographing it with a high-speed camera, the fluid creates a shape similar to that of a flower arrangement. This is art creation using fluid phenomena, and the authors call the art created by this method "fluid art."



Fig. 2. A scene from "Sound of Ikebana"

Tosa confirmed that various fluid shapes could be generated by changing the shape of the sound, its frequency, the type of fluid, and viscosity. Tosa further edited the resulting video to match the colors of the Japanese seasons to create a digital artwork called “Sound of Ikebana” [2]. A scene from the “Sound of Ikebana” is shown in Fig. 2.

A. “Sound of Ikebana” and Disaster Prevention

We assume that art is both beautiful and awe-inspiring or even frightening at the same time. For example, Munch’s “The Scream” stirs a sense of anxiety [3]. The “Sound of Ikebana” is also beautiful and fear-inspiring at the same time. Since the scene of the “Sound of Ikebana” appears to represent a tsunami because of its essential characteristics as “fluid art,” we decided to use the scene as a disaster prevention billboard based on the assumption that it would appeal as art and at the same time have the power to appeal to people’s preparedness for disasters such as tsunamis. Figure 3 shows the developed disaster prevention signboard. The signboard is displayed on the exterior wall of the experimental building of the Disaster Prevention Research Institute, Kyoto University (Fig.3). Since the exterior wall is located near the Keihan train tracks, the sign was installed to promote disaster awareness among the many passengers [4].



Fig. 3. Disaster prevention signage with the “Sound of Ikebana.”

Our research of disaster prevention fashion development is an extension of this disaster prevention signage.

V. DISASTER PREVENTION FASHION PRODUCTION

A. Creation of disaster prevention fashion design using digital art

Our project of disaster prevention fashion development is characterized by the fact that Naoko Tosa, an artist and a professor at Kyoto University, is in charge of the entire fashion-making process, from designing to sewing, using her students. By having the artist have the overall image and control of how the digital art she creates is made into fashion, the project was able to create fashion from digital art quickly.

Tosa art, the source of the designs, inspires a sense of fear and reverence in people and, at the same time, is appreciated by many people overseas as an expression of Japanese beauty [2]. Usually, Japanese-style designs are based on flowers and plants appreciated during the four seasons, such as cherry blossoms and autumn leaves, or buildings in ancient capitals such as

Kyoto. In contrast, Tosa art, as represented by the “Sound of Ikebana,” is expected to be accepted globally because of its abstract and organic shapes that evoke Japanese beauty.

B. Completed Disaster prevention Fashion

We have created several disaster prevention fashions, which are briefly introduced below.

1) Flooded coat

The entire garment is made from fabrics made of Aramid fiber, which is the heart of the disaster prevention fashion proposed in this paper (Fig. 5-Left).

2) Disaster prevention fashion with built-in LED

Visibility of people wearing fashionable clothing at night is important because the power supply is often interrupted during disasters due to power outages and other reasons. Furthermore, if a victim is buried alive due to a collapsed house, it is important to be able to locate the victim quickly. We created a disaster prevention fashion based on this concept with built-in LEDs (Fig. 5-Right)



Fig. 4. Completed disaster prevention fashion: Left-Flooded Coat, Right-Disaster prevention fashion with built-in LED

VI. APPEAL OF THE DEVELOPED FASHION

The developed fashion was unveiled at the New York Fashion Week in February 2025 and attracted great attention. Based on the feedback we received at that event, we plan to improve our disaster prevention fashion.

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