Typeharvesting: A Typeface Design Utilizing Time-dependent Appearance Change of Physical Materials

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ABSTRACT

In this research we propose a new method for typeface design that incorporates the chronological change of physical materials as the algorithm, and interventions by the environment and users as variables to determine the typeface shape in the design. We have focused on physical materials and phenomena with different time scales, such as vaporization of water, oxidation of copper, discoloration of leaves, and have designed and implemented a device for forming typefaces.

CCS CONCEPTS

•Applied computing → Fine arts; •Human-centered computing → Interface design prototyping;

KEYWORDS

Typeface, Graphic, Algorithmic Design, Physical Materials

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1 INTRODUCTION AND MOTIVATION

Algorithmic modeling methods generated by computer programs have been applied in many areas of architecture and design. These approaches will open up the possibilities of improving production speed, generating inadvertent designs without heavily relying on the designer, and providing the user an optimized modeling according to the situation.

As opposed to these computational methods, we propose to utilize the characteristics of various physical materials that exist around us as "algorithms". Though computer algorithms generate outcomes in a short time scale, in this research we attempt to use factors that change in a longer time scale, such as growing plants and stones eroding by rain as elements of design, while occasionally having the user intervene with that change.

We used these techniques for designing typefaces which are are widely used for transmitting and preserving information. A large selection of typefaces are available on the computer and the characteristics of their fine design play a role in visually conveying nuances and abstract information that cannot be expressed by language alone. Though efforts to use algorithms for typeface design have increased in recent years, even now it is still common to sketch each letter by hand and digitally trace them. This research aims to create typeface designs that cannot be generated through existing methods. Although there is work which creates typefaces using bacteria [Elisar 2016], we propose a more general framework for creating typefaces using physical materials.

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2 APPROACH

In order to acquire a design for typefaces that are different from those that are created by conventional methods, we propose a design system called Typeharvesting where the user harvests typefaces from physical materials. As the surface of physical materials changes over time, the user observes those changes and decides when to capture the typeface as digital data. That collects typefaces from physical materials by incorporating them. In this system, "moment of fixing characters on physical materials" and "suitable time" influence modeling of typeface. The feature of this system is that the modeling of the typeface continues to change or disappears on the physical materials until the user moves the typeface from the physical materials to the digital environment.

The change along the time depends on the selected physical material, the speed of change varies depending on the environment such as the temperature and humidity where the material is placed, changing the location where the user observes the surface change and touching the surface layer Changing the condition of the change by doing also influences modeling. The user observes the situation while keeping close to the change of the physical materials, and can intervene jointly with the change of the modeling of the typeface by intervening. It is possible to create multiple variations in one change at once by collecting the timing of sampling after collecting the typeface and collecting it many times.

It can be cited that changing the typeface once taken into the digital environment again by repeating the same process, fixing it to different physical materials and repeating the process. By repeatedly repeating the process, the variables given to the typeface become complicated, gradually deviate from the shape of the typeface, and a shape reflecting the change of the material is created.

This system is different from the conventional method of "hand making" or "computer algorithm" when making the typeface, in a long time The change of the physical material at the time of change and the selection of the user observing the change are the methods of determining the shaping.

3 SYSTEM

This system consists of physical materials with printed typefaces and a camera for capturing the change. By using a preset threshold value, the captured images are converted to binary images.

In the current trials, we printed 26 kinds of capital letters and 10 numbers of Helvetica Neue on the material in advance.

We selected three materials: copper, plant(ilex latifolia), water calligraphy paper. Copper used change in color due to oxidation, a change in gradually appearing. This plant (ilex latifolia) has a characteristic that it gradually changes its color discolored by scratching the back of the leaf or applying heat, and watching the change by describing the typeface while wearing it on the tree branch. Water calligraphy paper is used for practicing Japanese calligraphy, it changes color when water is applied, it gradually disappears by evaporation, and it can be used again.

4 RESULT

Figure 2 shows the result of the typeface transformation on physical materials. The duration which needed for the transformation differs according to the materials: water calligraphy paper (about 5 to 10 minutes), copper (1 week), and plant (1 month).

In the case of water calligraphy paper, we printed the set of typeface on the material using a stencil and water. Under a room temperature circumstance (24° C), the typefaces once bleed on the paper and then gradually get thin according to their evaporation. We also used a hot plate to accelerate the change. The result shape of typefaces could be affected by the temperature of the hot plate.

In the case of Ilex latifolia, it needs more time to change the typeface design. It can be affected by environmental factors (sunlight, water, soil). The designers can commit to the typeface design through the raising process of the plant.

5 CONCLUSION AND FUTURE WORK

We proposed design methods that incorporates the chronological change of physical materials and created typefaces using three different physical materials. The results are affected by environmental factors or material conditions.

In the process, the main role of the designer is to determine the initial condition and the timing for complete the change. The initial condition includes the type of materials, fonts, environments. Furthermore, if we print the typefaces transformed by material A onto material B, we can mix the characteristics of multiple physical materials to the results. In between physical and digital environments, the designer need find "appropriate" timing to complete the change.

In the future, we plan to improve the system to reduce the manual tasks in the process. We also develop a system to publish the typefaces with their process data and recipes.

REFERENCES

Ori Elisar. 2016. Living Language Project. (2016). http://orielisar.com/(Accessed 20 April 2017).

Figure 1: Typeharvesting typeface, top:water calligraphy paper 1min5sec, middle: copper 5days, under: Ilex Latifolia 24days

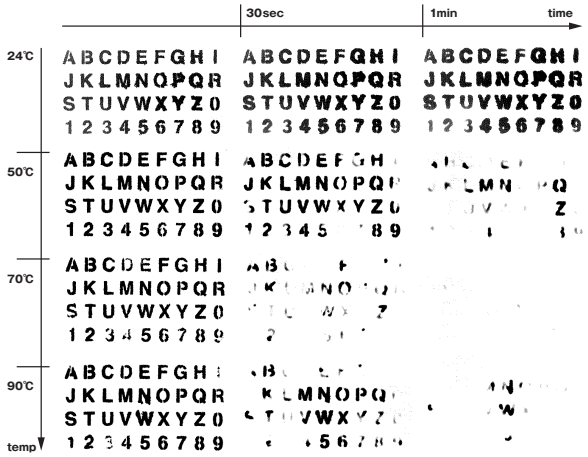

Figure 2: Typeharvesting water calligraphy paper different temperatures chart