

# Flower of Time: Universal Correspondence (時間之花：對應宇宙)

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## 中文摘要

《時間之花：對應宇宙》(Flower of Time: Universal Correspondence) 延續本人修讀博士期間發展之《時間之花》系列創作，是一個結合電子機械裝置及衍生性(Generative)環型動畫投影的空間，將於 2018 年 8 月 18 日於國立台灣美術館 108 展覽室呈現。本作品結合了數位成型設計、動力馬達控制、衍生性影像設計、環形投影等技術，以時間數據為經驗的核心，意圖彰顯出當下時間的多樣性及豐富性，使觀賞者能沉浸於時間之流，窺見每一秒鐘的豐富樣貌。本文分享概念、技術與創作時的心得回饋。

## 關鍵字

時間之花、電子機械裝置、360 度環形投影、數位成型、新媒體藝術

## Abstract

“Flower of Time: Universal Correspondence” is a continuation of the series of “Flower of Time” developed during my PhD study. It is a space that integrates an electromechanical device and a generative 360 degree projection. The work will be displayed at Room 108 at National Taiwan Museum of Fine Art on August 18, 2018. “Flower of Time: Universal Correspondence” integrates several computational techniques, including digital fabrication, dynamic mechanism control, generative animation design, and projection mapping. The reading of time is the core of the viewer experience. The work intends to demonstrate the diversity and richness of current time, and enables the viewers to immerse themselves in the flow of each second. This article shares the concept, techniques and some reflections through the making.

## Keywords

Flower of Time, Electromechanical Device, 360 Projection, Digital Fabrication, New Media Art

## 創作報告

### 1. Developmental Context

*Flower of Time: Universal Correspondence* aims to explore the aesthetic experience in human-clock interaction by materializing several characteristics of the ‘21st century Wundermaschinen’, a concept developed in my PhD thesis. These characteristics include rarity and refined labor, information-oriented visual complexity and assembling multiple epochal technologies. It is particularly developed to demonstrate how a clock could transcend

its utilitarian role and become a ‘mutually enveloping’ experience. What I mean by mutual enveloping is that *Flower of Time: Universal Correspondence* embodies at the same time precision (ticking and transforming according to the time readings) and visual complexity (producing multi-layered abstract visualization for the viewers’ aesthetic appreciation). This work will be exhibited in Room 108, Taiwan Museum of Fine Art between 18 Aug and 21 Oct 2018.

## **2. Design and Aesthetics**

*Flower of Time: Universal Correspondence* explores the aesthetic potential in the visualization of time. It is a spatial installation composed of 360 degree projection environment and an electromechanical sculpture at the center of space. The projection and the electromechanical sculpture are communicating with each other to create a space-time corresponding experience. *Flower of Time: Universal Correspondence* aims to display the depth and abundance of time by creating a corresponding space-time correlation. Through an artistic representation, it suggests that the concept of time is not linear but is multi-dimensional.

The 360 degree projection environment is created by nine projectors, each of them showing a generative visualization of flower that slowly changes the colors and formations. The electromechanical sculpture is a colorful mechanical flower, which is a data mapping mechanism that translates current time readings into correspondent patterns and colors. The mechanism is intentionally designed to be compact and concise in space to provoke visual density and complexity.

## **3. Technical Description**

### **3.1 360 Degree Projection Environment**

The 360 degree projection environment is built through nine projectors connected by a single computer with 11 video outputs. Each of the flowers is generatively created by *Processing* simultaneously. The hour, minute and second readings of time were translated into values for hue, saturation and brightness (HSB) respectively using simple algorithms that calculate and map the time digits. The flowers have more than 20 layers that slowly moved forwards and backwards at z depth, and rotate in different speeds and directions. The front petals overlap the ones in the back. This design is to create a visualization of complexity and to demonstrate the unique visual quality of occurrent data processing (see Figure 1 for the visualization of one flower).

### **3.2 Electromechanical Sculpture**

The electromechanical sculpture is assembled with laser-cut acrylic sheets, 3D printed sliding-tubes, metal screws, and a motor system. It is hanged in the center of space using clear fishing lines. The motor system is controlled by an Arduino UNO R3, utilizing stepper motor

driver (TB6560), timing belts and stepper motors (42BYGH60). The sculpture is an assemblage of six mechanical layers which respectively indicates the reading of second, minute, hour, day, month and year (see Figure 2 for the multi-layer structure). Each layer can change its color and formation depending on the current time readings.

The layer of second, being closest to the audience, ticks every second and completes its circulation in a minute. The farthest layer of year ticks once a year and completes its circulation in 100 years. Every tick changes the shape of the mechanical layer. In terms of the layer of second, the shape expands outward from the minimum to the maximum as the seconds go from 0 to 30; and otherwise shrinks back as the seconds go from 30 to 59. This mechanism is achieved by mapping the time digits to a range of steps for the stepper motors. The same concept of circularity is applied to all six layers. In other words, this mechanism allows the sculpture to perform each second in one hundred years with a unique visual representation.

In the exhibition, each layer has a precise color hue that is correspondent to the time readings. This is achieved through color light projection from the side of sculpture. The time readings are mapped into color hues according to their shared circularity. In terms of hours that went from 1 to 24, the color hue changes gradually from red, through yellow, green, cyan, blue, magenta and back to red (see Figure 4 for the color mapping scheme). The same mapping technique is applied to all six layers. The whole structure is assembled with transparent acrylic to create see-through and reflecting effects. In addition to the 'clock mode', the device also has a 'performance mode' that triggers every 10 minutes. In performance mode, the mechanism rhythmically and dynamically transforms its shape and colors. The visualization of projection and the sound of the space also changes during performance mode. The performance mode lasts one minute and then returns back to clock mode.

#### **4. Reflections**

*Flower of Time: Universal Correspondence* demonstrates one of the potential ways that emerging technology can reflect back on its own history and generate the imaginary to direct human thoughts and makings. It outlines a future space of dreams, vision and fantasy where potential knowledge and disciplines can emerge. Psychologist Robert D. Romanyshyn (1989) discusses technology as "symptoms and dreams", suggesting that: "To attend to the cultural dream of technology, then, is to attend to the shadows and silences of technology..." (Romanyshyn, 1989, p.13). In Romanyshyn's words, creative media practitioners utilizing technology then play an appropriate role in engaging these 'shadows and silences' with an aesthetic motive. How do we represent time in a way that is closer to the essence of it? Do we really need the readings, when we try to understand the concept of time? The practice of *Flower of Time: Universal Correspondence* facilitates the re-imagination of clock technology throughout the history and speculation toward future technology. This work serves to

encourage further creative practice to escape from a conventional experience-oriented design/art method, and shift to a media archaeological approach in thinking and making new technologies.

## 5. Images and Video Links

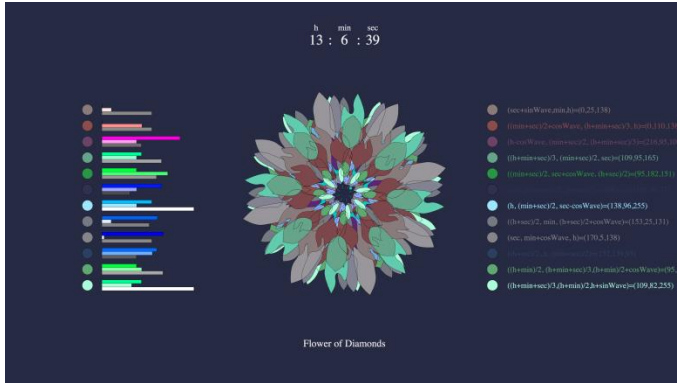


Figure 1



Figure 2

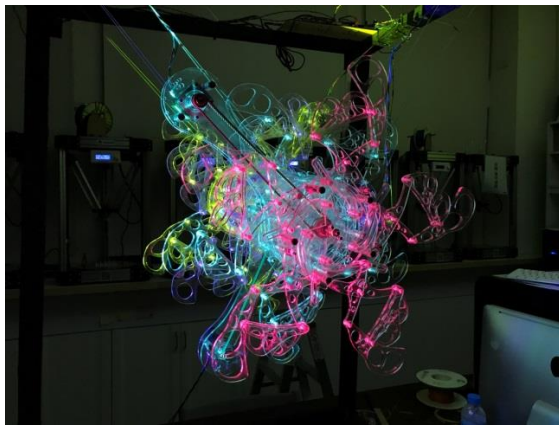


Figure 3

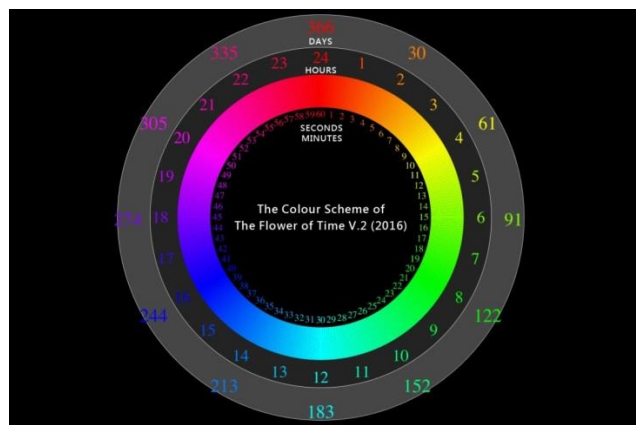


Figure 4

Video links: Electromechanical Sculpture <https://vimeo.com/255059723> ; Generative Visualization for Projection <https://vimeo.com/247659965>