

# ANASTATICA SENSIBILE: A CASE STUDY ABOUT NATURAL PROCESSES AS MEDIUM FOR INTERACTIVITY

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## Abstract

Interactive artistic installations, especially the ones exploiting digital technologies, represent an active area of research both from the artistic and technological sides. These works are able to detect different properties of people in the environment (e.g., motion, localization, gestures) and determine their behavior accordingly, for example modifying sounds and lights. Manifold installations have been realized exploiting audio-visual elements as key media for interactivity. This paper presents a case study of a non-conventional interactive installation ("Anastatica Sensibile"), which has been conceived around a natural process. In this installation people determine the life cycle of specific plants, in terms of an opening/closing process. The contribution of the paper is stimulating reflections about how the plants natural life cycle can become the fundamental element of an interactive artistic installation.

## 1. Introduction

*Artistic installations* (Oliveira, Oxley, Petry, & Archer, 1996) are powerful interventions to promote the participation of people in existing spaces. They are artworks consisting of several elements distributed along a physical space. Specific setting (e.g. walls, floor, lights) are used as part of composition. Viewers are able to move around the works and interact with them, so that they become part of that work in that specific moment in time. Artistic installations re-shapes spaces in new ways, re-appropriating spaces to their own artistic ends (Bestor, 1996).

In *interactive artistic installations* (Fox & Kemp, 2009)(Paul, 2008)(Bullivant, 2007)(Bullivant, 2006) viewers become *active participants* that determine the behavior of the installation. With the technology improvement over the years, artists are now able to create installations involving *sensors* (e.g. touch sensors, motion sensors) and *actuators* (e.g. lights, monitors, mechanical parts) providing rich and seamless form of interactivity.

Lights, sounds and videos are elements which have been widely exploited in interactive installations when looking to the forms of interaction: the behaviour of audience determines the behaviour of these elements. For example, lights may follow the paths of the people, while sound and videos may be modulated according the people localization (Bullivant, 2007)(Bullivant, 2006).

This paper presents and discusses an interactive installation ("Anastatica Sensibile") built in the beginning of 2012 for the Sant'Elmo castle in Naples, Italy. It is based on a non-conventional form of interaction centred on a natural process. The goal of the paper is stimulating reflections in the context of the debate about how avant-garde forms of Arts, especially ones exploiting digital technologies, may acts as a catalyst for promoting human awareness with respect to Nature topics.

The paper is organized as follows. Section 2 presents the installation. Section 3 discusses the artistic aims and several conceptual aspects. Finally, Section 4 points out some conclusions.

## 2. Anastatica Sensibile

### 2.1. The Natural Process

The installation has been conceived around the properties of a specific plant species, the *selaginella lepidophylla*. It is a species of desert plant noted for its ability to survive in almost complete desiccation.

During dry weather in its native habitat, its stems curl into a tight ball. However it can be revived with

only a little water. After wetting, the plant turns green in about one day hence the name of "resurrection plant".

The closing/opening process may be obtained also in our common environments. If the plants are not irrigated for a few days (one or two days according to the environmental conditions), they curl as in Figure 1. Then irrigating them with a small glass of water re-activate the plants, that turns green and re-open themselves in one/two days, as shown in Figure 2.

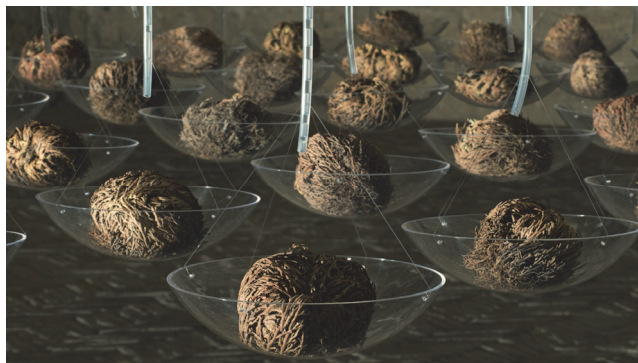


Figure 1: *Selaginella lepidophylla* before irrigation.



Figure 2: *Selaginella lepidophylla* after irrigation.

## 2.2. The Installation

The installation (called “Anastatica Sensibile”<sup>1</sup>) consists of a wooden platform with forty-five *Selaginella lepidophylla* plants held up by transparent PVC pipes that are connected to a common water tank (Figure 3). Every pipe is also equipped with a LED on the top. Every plant is provided with a small base able to accommodate the water as shown in Figure 1.

A digital system monitors the number of people around the installation. When the number significantly increases, one plant is *randomly selected*: the LED of the selected plant blinks for ten seconds. When a plant has been selected for a certain number of times, the digital system irrigates the plant and its LED is turned on. Once irrigated, the plant starts regenerating itself: it will be completely opened within about one day. An irrigated plant is excluded by the selection process for about four days, a time sufficient for the plant to regenerate itself and then to return in the “closed” state because of the absence of water. After this period, the plant becomes re-selectable and the LED is turned off.

This discontinuous mode of irrigation will do so all the plants never have "blossomed" but only some ones, and in close correspondence to the number of attendances of visitors. The plants which have not been watered they will remain closed until the next people increment. *Thus, the influx of people determines how faster the garden come to life and become lush.*

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<sup>1</sup> The title may be translated in English as “Sensitive Resurrection”. The word “Anastatica” derive from the Greek ανάσταση, resurrection.

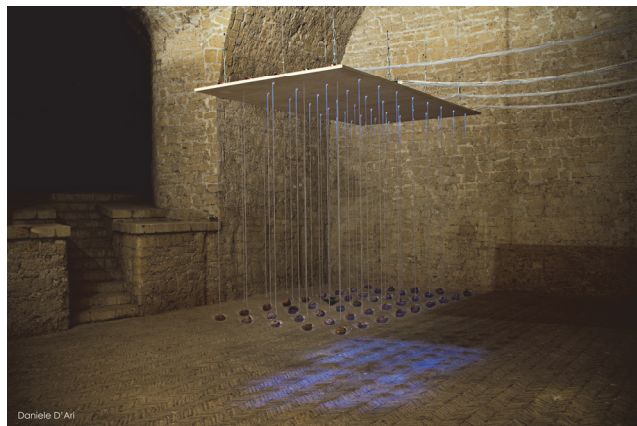


Figure 3: Anastatica Sensibile (photo courtesy of Daniele D’Ari).

### 2.3. Realization

Figure 4 shows the main hardware components employed by the installation.

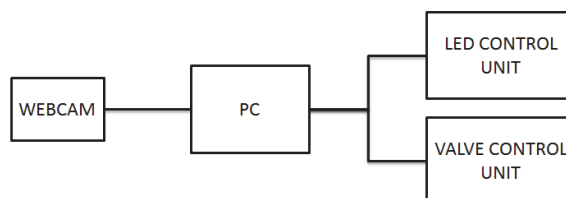


Figure 4: Physical components of the digital system which manages Anastatica Sensibile.

A webcam monitors the people presence within the room. Two electronic control units allow managing forty five LEDs and forty-five electro-valves.

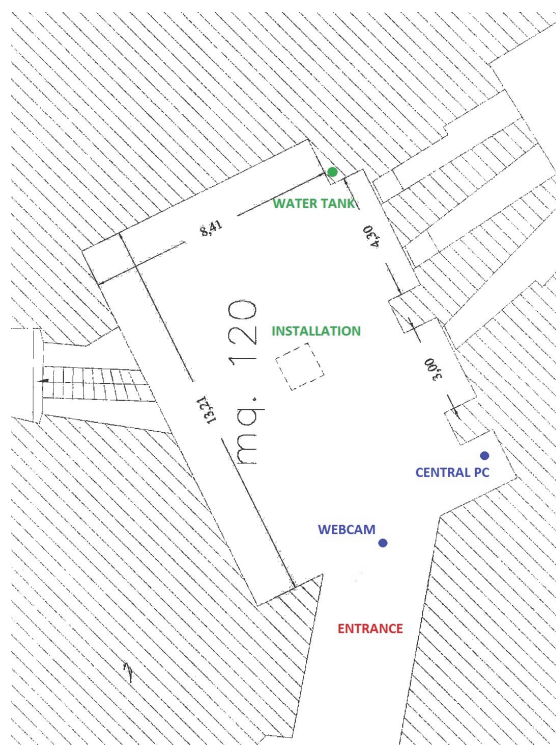
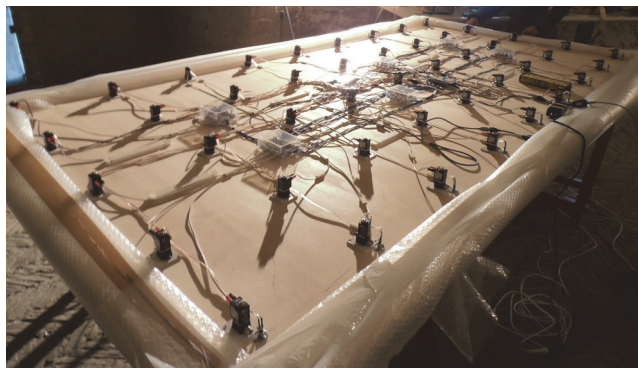


Figure 5: Positions of the installation components.

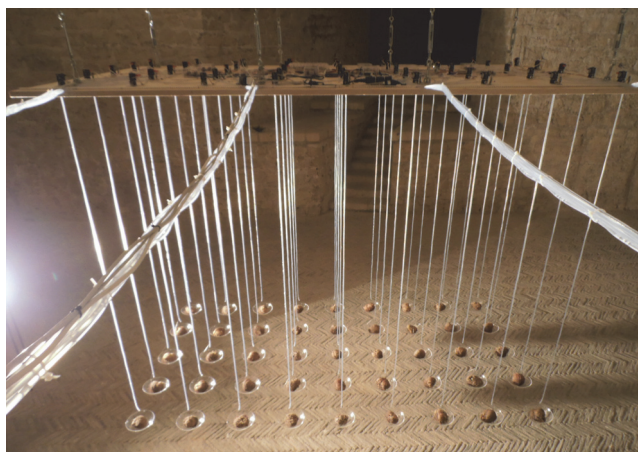
The webcam is positioned on the top of the entrance of the room (Figure 5). The electronic control units are mounted on the non-visible side of the wooden platform of the installation (Figure 6). Webcam and electronic units are connected to a central PC running ad-hoc software which manages

plant selection and activation.



*Figure 6:* The back-end of the wooding platform hosting the electronic units for commanding valves and LEDs.

Each electronic unit is realized by an Arduino Mega microcontroller plus a specific, self-made Printed Circuit Board (PCB). Each pipe enters in one electro valve connected to the water tank (Figure 7). The valves are normally closed. The irrigation of a plant is performed by opening for a specific number of seconds the corresponding valve.



*Figure 7:* The connection among pipes and valves.

People monitoring acts as showed in Figure 8. The system exploits a custom implementation of the computer vision method proposed by Jabri et al. (Jabri, Duric, Wechsler, & Rosenfeld, 2000) to determine how many people are around the installation.



*Figure 8:* Monitoring of visitors.

The plant selection & activation process is managed by the system as followings:

1. Counts, once per second, the number of people in the room by analyzing the images taken by the webcam as shown in Figure 8;



2. Verifies, once per second, if the current number of people is greater than the weighted average of the number of people counted in the last 60 seconds, compared to a fixed percentage rate;
3. If the condition in step 2) is not verified, the system resumes from step 1);
4. If the condition in step 2) is verified, the system:
  - i) Randomly selects a plant from a collection of nine plants determined on a daily basis. Every day, this set is re-determined in order to consider different plants from the previous ones;
  - ii) If the plant has not been irrigated in the last 4 days, the system:
    - a. Updates the number of selections for the selected plant;
    - b. If the number of selections for the chosen plant is less than a fixed threshold, the LED blinks for a predetermined time;
    - c. If the number of selections is greater or equal than a fixed threshold, the selected plant is irrigated: the corresponding valve is opened for a time such to allow the discharge of about 75 ml of water. In addition, the LED of the irrigated plant is switched on. An irrigated plant is excluded from selection till 4 days after the instant of time of irrigation; after this period the plant return selectable, the LED is turned off and the number of selections for the plant is set to 0.
5. If the plant was irrigated in the last 4 days, the system resumes from step 1).

The limit of nine activable plants per day has been introduced in order to avoid that a high influx of people could activate all the plants in the same day. Anyway all the involved thresholds can be changed in the initialization of the system.

Finally, it should be highlighted that the control algorithm has been defined from the collaboration with the artist and the technologists.

### 3. Discussion

#### 3.1 Artistic Intention

The research of the artist is strongly focused on the relation among humans and Nature. Digital technologies give her the possibility to work at this boundary making interactive artworks that may stress the (apparent?) dichotomy between natural versus artificial artefacts.

In *Anastatica Sensibile* the audience determines how and when the garden come to life. In this relationship water acts as an intermediary, in a fundamental exchange that trigger a virtuous loop of reciprocal nourishment.

There is also a symbiosis between thirst for knowledge and the natural thirst of water. Two different concepts of needs presented in the installation that make technology just instrument, not object, in demonstration of how the artistic creative process dominate the productive one. Human being give life with their presence through irrigation, that is at the same time both natural and artificial process.

The accountability of the public is in close connection that is established between them and the work. It's only through people actions, measured thanks to technology, that it will be guaranteed the revival of the work, in both senses artistic and aesthetic.

In addition the artist wants that visitors, through their attendance, take care and preserve over time the work. There is a particular ecological nuance that emphasize the, always most, critical interaction between human knowledge and Mother Nature preservation, or rather between progress and sustainability. Thus *Anastatica Sensibile* establishing a connection between artistic practice and phenomenology of everyday life.

#### 3.2 The Slowness of the Opening Process

As has been said, the *selaginella lepidophilla* takes some hours to completely open after irrigation,

generating delay in the causality between bloom and people flow. Vice-versa the irrigation process is fast and silent.

The slowness of the natural processes entail new types of interactions. In this sense the installation is an example of the Slow Technology vision by (Hallnäs & Redström, 2001). According to this approach, technology should stimulate reflections and moments of mental rest rather than efficiency in performance. But slowness in *Anastatica Sensibile* comes as a result of the blooming process, allowing to nature to re-appropriate of its life rhythm.

### 3.3 Audience Feedback

The installation has been showed during May 2012. Two key considerations may be reported from the feedback of the audience.

In some cases the contribution from the people influx to the plants lifecycle has not been fully understood. People guess that their presence active the LEDs and that they are in relation with the plants but the actual relations is fully realized reading the description of the work only. This is a typical side-effect observed on slow technology applications (Hallnäs & Redström, 2001).

On the other hand the audience appreciated very well the installation itself especially in relation with its site (a castle). The adoption of plants and their exploitation in the overall installation has been perceived of highly aesthetic values even without fully understand the interactive process behind the work.

## 4. Related Work

Numerous example of interactive installations have been proposed by several artists, architects and designers (Fox & Kemp, 2009)(Bullivant, 2007)(Bullivant, 2006). They range from adaptive light installations in museums and urban spaces up to installations employing sophisticated mechanical actuators. For example Camille Utterback's *Abundance* ("Camille Utterback web home page," n.d.) is an installation where different-colored patterns are projected onto the City Hall building of San Jose (California, USA) according to varied people factors, such as people's locations and whether they move alone or in groups. Michael Fox's *Bubbles* (Fox & Kemp, 2009) is an adaptable spatial pneumatic installation at an urban scale. The installation consists of large pneumatic volumes that inflate and deflate in reaction to the visitors coming to the site.

Compared to these works, *Anastatica Sensibile* is clearly original because it exploits a natural process for making interactions with the audience.

There are other researchers that have been exploiting plants and vegetal forms in Architecture, Design and Arts.

Patrick Blanc ("Patrick Blanc's Vertical Garden web home page," n.d.) is famous for realizing the so-called green walls / vertical gardens. They are facades of parts of buildings that are partially or completely covered with vegetation. *Interactive Plant Growing* by Christa Sommerer and Laurent Mignonneau ("Christa Sommerer & Laurent Mignonneau web home page," n.d.) uses living plants as the interface that affects a 3-D animated plant environment whenever humans touched or approached the plants. Other digital-based works take inspiration from natural and biological phenomena for different results. For example the 2012 edition of the *Transnatural festival*<sup>2</sup> included a section for digital artworks which exploit genetic algorithms, i.e. computational techniques that mimic biological/evolutionary processes.

Even with respected to these work *Anastatica Sensibile* is original because the natural process is exploited at the interaction level.

## 5. Conclusions

We think that our experience may provide an useful experimental case study on the research practice at the intersection of Arts, Technology and natural processes. Moreover we hope that the developed

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<sup>2</sup> <http://www.transnatural.nl/>

installation may stimulate reflections about the role of Arts in our contemporary needs. We are try to develop a system where technology take care of life and nature. In this role humans gives their contribute firstly in unaware manner. Symbolic significance of nature preservation that from unaware may became aware for visitors is the first message that *Anastatica Sensibile* wants to share, and Art became the instrument to make this possible.

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