

STARTS Residency Public Report

Reactive Matter

Scenocosme: Grégory Lasserre & Anaïs met den Ancxt

Abstract

“Reactive matter” resulted in an interactive behavioural artwork. Similar to a living organism, this sculpture deploys in the area, perceives and feels its environment. The hybrid electronic ecosystem is composed of more than 120 independent cellular robotic structures that are linked together. The work was built on a co-creative collaboration with the scientific project “Programmable Matter” of the research lab FEMTO-ST (Science & Technology). The collaboration contributed positively to the work of both parties, allowing them to explore new approaches, share knowledge and perspectives, and develop new functionalities. From the artistic point of view, it was significant to learn about the program, algorithms, tools and electronics developed by the scientific project, and have the chance to develop a new interactive artwork that explores the links between the real and virtual, the natural and digital, and its various significances. From the scientific perspective, the collaboration with Scenocosme was decisive to upgrade and enhance their device and firmware. Both parties perceives the artwork “Reactive Matter: Rhizome 001” as a good medium to present the work of “Programmable Matter”, as it shows how a complex system, made of several computing entities, can react when stimulated by different natural triggers. The artwork was jointly presented at the Technology and Emotions: conference for co-creation, in 2017; STARTS Residencies Days 2018; STARTS Pro Day, at the Scopitone Festival, in 2018; Arts & Sciences Biennial Experimenta, in 2020; and STARTS Residencies Days 2020.

Index Terms: interactive, installation, programmable matter, blinky blocks

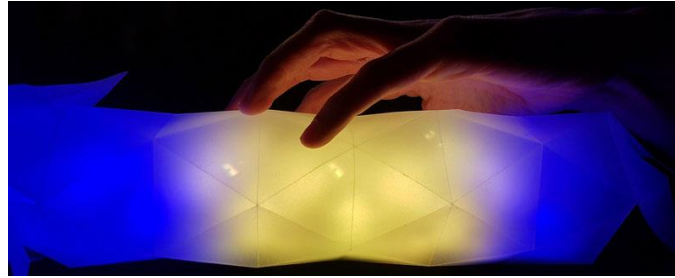
I. INTRODUCTION

Scenocosme is interested in contemporary artworks that explores possible hybridizations between the technology and the living world (plants, stones, water, wood, humans,..) in order to produce innovative sensitive and poetic sonorous and/or visual languages. In “Reactive Matter”, we have worked with the scientists Julien Bourgeois and Benoit Piranda of the research project “Programmable Matter”, based at FEMTO-ST, France. “Programmable Matter” aims to create a new smart system made from a hardware component and a software approach that will enable the creation of basic blocks of programmable matter — a matter made from centimetre-size modules attached together, able to communicate with each other and change its physical properties according to an internal or an external action.

We approached “Programmable Matter” as a good opportunity to develop a new interactive artwork that would explore the quality of real and virtual touch, and its various significances. Several questions lighted up the development of our work in “Reactive Matter”: what kind of poetic and symbolic relationships the electronic clay could create? How it is possible to build, to sculpt an intuitive and evolutive musical score with blocks? Where each “molecule” could be used in a score model? How is it possible to link several objects together? To create a singular network? To gather several spectators in a performance?

Based on the concept of synthetic reality, we aimed at creating a large sculptural and interactive artwork with organic behaviour, by working with small interactive objects that can be assembled in order to create large structures.

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II. ARTWORK

The residency resulted in the artwork “Reactive Matter: Rhizome 001”, an interactive light and sound behavioural installation made of small robots: “the Blinky Blocks”. Similar to a living organism, this sculptural and interactive artwork deploys in the area, perceives and feels its environment. The hybrid electronic ecosystem is composed of more than 120 independent cellular robotic structures that are linked together. Each group of cells is grafted with a transparent membrane that allows it to feel the caresses and breathe of the spectators. Each robotic structure also perceives sounds and reacts with different feedbacks. The variations change depending on the intonations of the voices and the duration of the vocalizations. Each of the 120 electronic cells is retroactive. They emit different sounds, rhythms and light intensities in response to the audience stimuli.

The artwork surface is made of 120 micro-controllers, 120 independent micro-speakers, 120 light sources, etc. Sensitive, robotic bases also influence each other, between neighbouring cells, like cooperative living organisms. “Rhizome” is inspired by the communication and spatial arrangement of plants, corals, termites, fireflies, micro-organisms, etc.



III. METHODOLOGY

Reactive Matter Residency was based on a co-creative work, in which both artists and scientific partners exchange knowledge and perspectives. Following this approach, we first imagined different shapes for the blocks explored by the “Programmable Matter” project. This work was, then, further developed, by sharing points of view with the scientific project. With the scientists, we have spent time to learn their concepts, how to use and program with the algorithms, their tools and electronics (*see box below with the description of the main technologies used*). This collaboration has helped the scientific partner to upgrade and enhance the device and firmware of the blocks.

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“Programmable Matter” and “Claytronics” (electronic clay)

The nano-metric robots called “claytronics” atoms (or “catoms”) can be assembled to form larger objects. The denomination is a contraction of “clay” and “electronics”. The principle is to create small interactive objects capable of being linked together for design large structures that can be freely transformed. This is the concept of synthetic reality. They are called “catoms” by analogy with the term “atom”. Assembling through electromagnetic forces these objects can interact together. These “catoms” can form easily modifiable objects such as modelling clay. The fabrication methods for realizing these “catoms” is being invented. For now, only few research laboratories in the world are developing macroscopic-sized prototypes. They are also developing new algorithms and specific electronics that allow “catoms” to communicate together to constitute a single whole. Each element of this matter can be programmable.

“Blinky Blocks”

“Blinky Blocks” can be assembled as easily as LEGO. The whole object is able to produce environments with simulated artificial behaviours. The “Blinky Blocks” are “claytronics” originally developed by the Carnegie Mellon University in Pittsburgh, Pennsylvania. In France, at Montbéliard, on the site Numerica, the research laboratory FEMTO-ST is working in an algorithmic part of the Blinky Blocks. The current generation of “Blinky blocks” are cubic, 4cm-side. These electronic devices are capable of emitting coloured light and sound. They are equipped with a gyroscopic sensors and a microphone. They are perceiving the sound, the vibrations, the movements and they can interact with each other. It is possible to agglomerate them by magnetization and they are able to transmit computer data to their neighbours.



Other “Programmable Matter” hardware is being developed at the University of Tokyo with a spherical shape, a size of a few millimetres and with the ability to move by themselves. The difficulty is to create an object capable of changing shape and being conscious of its shape in the physical space. This is necessary to inject programs and “Artificial Intelligence” into these tiny robots to give them the ability to shape complex objects and to interact with each other.

IV. CO-CREATION PROCESS

The collaboration established in Reactive Matter was very positive for both parts. Given the extensive background of artists and scientific partners in working with technology, all the contacts and discussions were fluid, what facilitated the work performed during the residency. The research project has developed and produced 2,000 “Blinky Blocks” and helped us in understanding the functionalities of these structures. During the time spent on the lab, we were able to jointly discuss the work developed by the scientific partner, while addressing the requirements to create our artwork. These discussions resulted in fruitful and innovative ideas. We have, for instance, invented new ways of interaction for the blocks with the quality of the touch and breathe, detected bugs in the firmware, open new ways of interaction and communication with the sound by imagining a different use of the blocks’ microphone, and developed a new way to power the blocks much more discreet and which we use to take videos of our experiments.

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V. IMPACT

Reactive Matter Residency had a significant impact on both the artists and scientific partners. It gave to each of us the possibility to enlarge our research spectrum and enhance our work. Due to the collaboration, the team of “Programmable Matter” project has changed various things in the hardware, as well as in the software (*see previous section*). We were the first users of the platform and, thus, contributed to improve it by detecting several software related problems.

At the same time, from an artistic point of view, this residency allowed us to further explore the links between the real and virtual. Most of our artworks explore the human relationship with natural elements, by creating sonorous or visual languages in order to stimulate spectators to reflect about their relationship with our contemporary environment. Think and work with scientists gave us the possibility to use their technology to design new artworks and new ways of interaction with the public.

VI. CONCLUDING REMARKS

The work performed during Reactive Matter Residency has benefitted both partners and the goals established were positively achieved. During the residency, the work process and its results were presented internationally: Technology and Emotions: conference for co-creation, in 2017; STARTS Residencies Days 2018; STARTS Pro Day, at the Scopitone Festival, in 2018; Arts & Sciences Biennial Experimenta, in 2020; and STARTS Residencies Days 2020.

In the future, we would like to continue our work with claytronic atoms, inclusively with smaller claytronic atoms. We are all made up of atoms communicating with each other. The principle of “Programmable Matter” is similar: to develop primary bricks capable of communicating with each other in order to organize themselves. This territory of research is very stimulating. In the next times, we aim at developing artworks with robotic artificial intelligent able to grow in the space and auto change their shape, at any moment. This will bring multiple exciting challenges, namely the development of a new way of designing an artwork taking into consideration the physical exhibition space.

ABOUT THE AUTHORS

The couple of artists Grégory Lasserre and Anaïs met den Ancxt work under the name Scenocosme. They live in the Rhone-Alpes region in France. Their singular artworks use diverse expressions: interactive installations, visual art, digital art, sound art, collective performances, among other forms. Scenocosme mix art and digital technology to find substances of dreams, poetry, sensitivity and delicacy. These artists overturn various technologies in order to create contemporary artworks. Their works came from possible hybridizations between the technology and living world (plants, stones, water, wood, humans) whose meeting points incite them to invent sensitive and poetic languages. Most of their interactive artworks reveal various relationships between the body and the environment. They can feel energetic variations of living beings and design interactive stagings in which spectators share extraordinary sensory experiences.

Their artworks are exhibited in numerous museums, contemporary art centres and digital art festivals in the world.

They have exhibited their interactive installation artworks at ZKM Karlsruhe Centre for Art and Media (Germany), at Daejeon Museum of Art (Korea), at Museum Art Gallery of Nova Scotia (Canada), at National Centre for Contemporary Arts (Moscow), at Contemporary Art Museum Raleigh (USA), at Bòlit Centre d'Art Contemporani (Girona) and in many international biennals and festivals : Art Center Nabi / INDAF (Seoul), BIACS3 / Biennial International of Contemporary Art of Seville (Spain), Biennial Experimenta (Australia), NAMOC / National Art Museum of China / TransLife / Triennial of Media Art (Beijing), Futuresonic (UK), WRO (Poland), FILE (São-Paulo), ISEA / International Symposium on Electronic Art (2009 Belfast, 2011 Istanbul, 2012 Albuquerque, 2013 Sydney), EXIT, VIA, Lille3000, Ososphere, Scopitone, Seconde nature (France)... during important events : World Expo (Shanghai), Nuits Blanches (Toronto, Halifax, Singapor, Bruxelles, Brighton, Amiens, Segovia, Bucharest), Fête des lumières (Lyon)... and in various art centers : MONA (Australia), MUDAC, Fondation Claude Verdan (Lausanne), Musée Ianchelevici (Belgium), Kibla (Slovenia), Banff Centre (Canada), Villa Romana (Firenze), Utsikten Kunstsenter (Norway), Watermans (UK), Centre des arts d'Enghien-les-Bains, Gaîté Lyrique (Paris) etc.

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Website: <http://www.scenocosme.com/>

Reactive Matter dedicated webpage: www.scenocosme.com/reactive_matter_e.htm

Reactive Matter at STARTS Residencies platform: <https://vertigo.starts.eu/calls/2017/residencies/reactive-matter/detail/>