METAGARDEN SPHERE2

General description of the project

Tanja Vujinović

"A garden is never a garden of merely private concerns into which one escapes from the real; it is that plot of soil on the earth, within the self, or amid the social collective, where the cultural, ethical, and civic virtues that save reality from its own worst impulses are cultivated. Those virtues are always ours."

Robert Pogue Harrison

What will our future gardens, the gardens of the third millennium, look like?
Will they be made of objects, machines, and living beings that synergistically maintain their flexible systems and communicate with their surroundings?
MetaGarden is an ongoing project that reflects upon a complex relationship of humanity and its technologically fortified environment of nature-culture, and focuses on a particular issue within each installation.
Through MetaGarden Sphere2, I attempt to examine not only what exists within our lives, but also what multiple possibilities and changes might emerge in biopolitical, social, and environmental domains.
Throughout history, the garden as a sheltered environment has been re-emerging as a special location for human contact with nature, recreation, and rethinking of mythologies, social relations, and allegories.
Gardens have never held unitary functions or forms. Filled with idealised flora and fauna or devised as minimalistic environments, gardens would sometimes induce ecstatic feelings or provoke meditative immersions and reflections. The classical Greek Epicurean school promoted understanding of the world through the tending of gardens and, instead of overcoming, it was all about transfiguring nature and self-cultivation. Epicurus viewed gardens as places in which reality could be reconceived and reimagined.
Michel Foucault thought of gardens as the perfect heterotopias – the other places, detached from ordinary life. Within gardens, we immerse ourselves in relationships with living and non-living objects or non-human agents, and seek in them the forms of transitional, comfort objects. Gardens infuse us with molecules and affect our senses, but we also infuse gardens with our states of mind and impose forms onto nature. Gardens echo our lost contact with nature brought forth by the rapid development of industry and technology. They are associated with regeneration of human beings, our reconnection with nature, and the notion of care and cultivation of both ourselves and our nature-culture environments.
Since the very beginnings of civilisation on Earth, humans have turned to plants for food, shelter, and medication. Recreation in nature has always been advised in the

form of walks[1], meditation, observation of plants, breathing of the healing air in the woods, and tuning in to the countless signals and chemical communication channels of the surroundings. Gardens might be seen as networks of engineered man-made and natural elements that promote the flow among non-human and human agents. Jean Luc Nancy's concept of synaestetic touch that underlines the necessity to pay special attention to senses other than vision, like touching and smelling, might pave the way for cultivating a novel attitude towards nature in the post-digital world.

Gardens might also be microcosms that temporarily separate a person from the rest of the anthropocentric world and enfold one into their special texture. As Michel Foucault would say, "the garden is the smallest parcel of the world and then it is the totality of the world."

What might our future habitats look like? Are we going to seal ourselves off from the atmosphere due to pollution and live in chambers that look like an Apple parking building or Amazon Spheres? If so, who will be able to afford the type of hi-tech water, air purification, and maintenance of plant growth inside the future farming facilities? Such future chambers may enable us to experience the world of "wilderness" to its fullest in a tamed form, devoid of any danger, disorientation, darkness, and of anything uncontrolled. Aquaponic gardens for industrial production of plants operated entirely by robotic agents offer a glimpse into a potential future scenario.

Utopian ideas have occasionally sprung up of an idyllic garden spreading around the whole Earth, like the one envisioned by futurist Jacques Fresco with his Venus project. We might be very far from such a scenario, but we could at least work towards curbing environmental pollution and providing everybody with access to clean natural environments. A potential way towards the MetaGardens of the future is co-creation with nature and the engineering of upcoming civilisation informed by bionics and biomimicry. Biomimicry, the term coined by Janine Benyus in the 1990s, is the outlook that strives not to extract from nature and domesticate it, but to create solutions learned from the ideas that appear everywhere in the natural world. As Benyus writes, some of the core principles of nature are that it runs on sunlight, uses only the energy it needs, fits form to function, recycles everything, and rewards cooperation. These principles, i.e. functions of nature, should be embedded in the materials of future design – from apparatuses to buildings and infrastructure.

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[1] "We should take wandering outdoor walks, so that the mind might be nourished and refreshed by the open air and deep breathing." Seneca, XVII.

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ARBORA

Objects (3D printing, custom-made electronics, custom-made software, sound)

Project by Tanja Vujinović
Programming and custom-made electronics for Arbora object: Vid Podpečan
Custom-made electronics for Arbora Protectors objects: Gregor Krpič
3D printing: RogLab
Consulting: Vid Podpečan, Jan Kušej, Jelena Guga, Gregor Krpič, Tomo Per
English language editing: Derek Snyder
Production: Ultramono and SciArtLab IJS, 2019
Project is supported by The Department of Culture of Municipality of Ljubljana

Placed within the MetaGarden Sphere2, Arbora is one of the objects that takes care of our health and the health of our environments.
As a wise, old tree rising from the MetaGarden, Arbora is infused with a neural network that understands and responds to human emotions.
Three protector objects that accompany Arbora and Carboflora's virtual environment are all inspired by the plants of the Carboniferous era. Outer surfaces of some objects are covered with bark that resembles scales, much like the Lepidodendron tree that existed approximately 300 million years ago. Fossils of this plant sparked the imagination of our ancestors and might even be responsible for the imaginary conception of dragons.
Emerging from the cloud of mythology, three protector objects are synthetic young trees grown in software. They resemble sprouts and like three ancient Greek gods of medicine, Telosphoros, Hygieia and Asclepius, monitor and reflect the overall environment of MetaGarden.
Arbora senses the emotions expressed in the voice. Our voices can give clues about both the physiological and emotional state we are in. A specially developed and trained deep neural network deciphers the emotional components encoded in the captured voice in order to model a soothing binaural sound. By doing so in synergy with its environment, Arbora, together with its helpers, works towards improving our well-being.

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CARBOFLORA

Installation (generative digital environment)

Project by Tanja Vujinović
Production: Ultramono and SciArtLab IJS, 2019
3D objects, generative modelling: Tanja Vujinović
Unity3D programming: Gaja Boc, Sara Bertoncelj Čadež, Tanja Vujinović
3D objects of carboniferous plants: Dariusz Andrulonis for edukator.pl
Consulting: Vid Podpečan, Jan Kušej, Jelena Guga
English language editing: Derek Snyder
Project is supported by The Department of Culture of Municipality of Ljubljana

This virtual environment is populated by plants that echo the Earth's flora from hundreds of millions of years ago, specifically, the plants of the Carboniferous period that now constitute coal fields.
As is widely recognised, our age, aptly named "capitaloscene" by Donna Haraway, is detrimental to the environment and health of all living organisms.
Use of fossil fuels has been repeatedly proven detrimental to the Earth as a whole, yet hope persists that if we completely end our use of fossil fuels, we might reverse some of the effects of global warming and try to restore some of the damage we created over the last two centuries of industrial progress.

Forests of the Carboniferous age consisted of many relatives of contemporary plants – conifers, horsetail, and ferns. Some of the plants, like the early relatives of ferns, could grow to forty meters high. Lepidodendron trees had bark that resembles scales. Fossils of this plant sparked the imagination of our ancestors and might even be responsible for the imaginary construction of dragons.

Although declining, coal is still widely used in industry, not only for direct energy production but also for numerous industrial applications and derivatives; it remains a significant source of carbon dioxide emissions in the atmosphere.

Carboflora environment is connected to tracking the quantities of harmful particles in the atmosphere. Its levels are reflected in the way plants inhabit the virtual system. Properties of virtual plants are connected to a database that tracks air quality in almost real time. More than 10,000 stations throughout the world constantly send data about various pollutants like PM2.5, PM10 (small and big particulate matter), O_3 (Ozone), NO_2 (Nitrogen dioxide), SO_2 (Sulphur dioxide) and CO (Carbon monoxide), as well as the AQI (air quality index). Upon opening, the application chooses the closest physical location and maintains the various properties of plants according to the numbers being sent from the database.

Plants as a sort of timeless ur-forms echo the past and possible future within which we might curb our polluting emissions.

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FONTANA

Installation (3D prints, steel, water, glassware, atmospheric pressure plasma generating device, Argon)

Project by Tanja Vujinović
Production: Ultramono, 2019
Advisors:
Arijana Filipić, Department of Biotechnology and Systems Biology, National Institute of Biology
Dr Gregor Primc, Department of Surface Engineering and Optoelectronics, Jozef Stefan Institute
Dr Zoran Lj. Petrović, Institute of Physics, University of Belgrade
The plasma module is produced by the Department of Surface Engineering and Optoelectronics, Jozef Stefan Institute
Hardware: Roman Bevc
Custom made electronics for Small Fountain: Gregor Krpič
Additional consulting: Jan Kušej, Jelena Guga
English language editing: Derek Snyder
Project is supported by The Department of Culture of Municipality of Ljubljana

Inside gardens and parks, fountains are usually placed as central features due to their symbolism, echoing the historical and cosmological role of water as a substance crucial to life on Earth.
How will we overcome the far-reaching consequences of growing environmental pollution? What novel ways can we invent to clean or recycle water already used in the industrial production of goods?

Sometimes referred to as the fourth state of matter, plasma is an ionized gas almost acting as a tiny lightning bolt. In scientific research, plasma is used for various purposes. Among promising features is its ability to destroy harmful microbes in different environments including water. UV radiation, charged particles, and reactive oxygen and/or nitrogen species are plasma's constituents that have great antimicrobial properties – these reactive species are believed to be the most important in terms of microbe destruction. Plasma might also be the future technology for cleansing the leftover traces of manmade chemical contaminants in water, from toxic dyes to drugs. Research has also indicated that crops or seeds treated with plasma-treated water are more resistant to diseases and can germinate faster, thus producing a higher yield crop. This type of water management might be a potential future technology that will reduce the use of unnecessary chemicals in water cleansing, not only for industrial and agricultural use but also for safe human consumption.
As a potential technology that might be widely used, the treatment of water with plasma is implemented in the installation – plasma-treated water is both the actual agent of change and the symbol of growth and purity.

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GENERA

Installation (3D printing, custom-made electronics, hardware)

Project by Tanja Vujinović
Hardware device development: Dr Luka Suhadolnik, Department for Nanostructured Materials, Jozef Stefan Institute, Slovenia
Additional hardware: Roman Bevc
3D printing: Stephan Doepner, Cirkulacija 2
Advisors:
Dr. Luka Suhadolnik, Department for Nanostructured Materials, Jozef Stefan Institute

Prof. Saša Novak, Department for Nanostructured Materials, Jozef Stefan Institute
Electron Microscopy analysis: Maja Koblar, Center for Electron Microscopy and Microanalysis (CEMM), Jozef Stefan Institute
Additional consulting: Jan Kušej, Lenart Krajnc
English language editing: Derek Snyder
Project is supported by The Department of Culture of Municipality of Ljubljana
Production: Ultramono, 2019

Placed within the MetaGarden Sphere2, Genera is one of the objects that takes care of our health and the health of our environments.

Genera is a model futuristic device for the purification of indoor air. Its shape comprises generic branches converging into a trunk-base, and the air passing through them is drawn through an air purification device located at the base of the object. The air purification device uses photocatalytic technology, which represents a potential system for removal of pollutants from indoor air. Improved air quality would improve quality of life, as the average individual spends most of her life in confined spaces. The photocatalytic air purification device uses the principles of photocatalytic degradation of organic compounds, bacteria, and other potentially harmful substances. Contaminants are decomposed on the surface of titania nanotubes (the active photocatalyst is activated by UVA light illumination), which are grown directly on titanium substrate using an electrochemical method. Photocatalytic oxidation can play a crucial role in indoor air treatment, as it represents an efficient and cost-effective green technology. In future MetaGardens we could have such branch-shaped devices that maintain safe levels of pathogens in the air.

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