

ARTIFICIAL INTELLIGENCE AND INTERCULTURAL DIALOGUE

2019



Russian Direct Investment Fund (RDIF), Russia's sovereign wealth fund, was established in 2011 to make equity co-investments, primarily in Russia, alongside reputable international financial and strategic investors. RDIF acts as a catalyst for direct investment in the Russian economy.

RDIF's management company is based in Moscow. Currently, RDIF has successfully implemented more than 70 joint projects with foreign partners, totaling more than RUB 1.5tn, and injecting investment into 95% of Russia's regions.

RDIF portfolio companies employ more than 800,000 people and generate revenues which equate to more than 6% of Russia's GDP. RDIF has established joint strategic partnerships with leading international co-investors from more than 15 countries that total more than \$40bn.

RDIF develops relationships and maintains intercultural dialogue with partner countries. It has jointly implemented a number of landmark projects with Russia's leading cultural institutions including the Mariinsky Theatre, the State Hermitage Museum and the State Russian Museum.



HERMITAGE

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The State Hermitage Museum

The State Hermitage Museum is one of the world's largest museums, with a collection of over 3 million works of art, artifacts from the ancient world to present day.

It is estimated that the Hermitage was founded in 1764, when Empress Catherine the Great acquired an impressive collection of European paintings. Today the museum's main collections are exhibited in the Winter Palace, the former residence of the Russian Tsars.

The museum has been open to the public since 1852.

Masterpieces from Leonardo da Vinci, Raphael, Titian, Rembrandt and Rubens are among the Hermitage collection's most famous artworks. The Hermitage also has one of the world's best collections of Dutch art from the 17th century, as well as an outstanding collection of French art from the 19th and 20th centuries.

Following a presidential decree on 18 December 1991, the State Hermitage Museum was included onto the list of objects of Russian national heritage. The museum is also under the personal patronage of President of Russia.

The project "Hermitage 20/21" was launched in 2007 with an aim to collect, exhibit and study contemporary art, as well as to build the museum's contemporary art collection.

SUPPORTED BY



The Ministry of Culture symbolizes the national and international advancement of culture in the Kingdom of Saudi Arabia. The Ministry will preserve the Kingdom's historical past and promote a culturally rich future that fosters art and culture.

The Ministry was created on June 2, 2018 by Royal Order, under the leadership of His Highness Prince Badr bin Abdullah bin Farhan Al Saud, the Kingdom's first dedicated Minister of Culture.

The Ministry has a crucial role to play in delivering Saudi Arabia's ambitious transformation program, Vision 2030, contributing towards building a vibrant, thriving, and ambitious nation.

The Ministry formally launched on March 27, 2019 when it published the cultural vision for the Kingdom. This set out the Ministry's key aspirations, which are: promoting culture as a way of life, enabling culture to contribute to economic growth and creating opportunities for international cultural exchange.



About the Public Investment Fund (PIF) of Saudi Arabia

The Public Investment Fund seeks to become one of the largest and most impactful sovereign wealth funds in the world, enabling the creation of new sectors and opportunities that will shape the future global economy, while driving the economic transformation of Saudi Arabia. To achieve this, the Fund is building a world-class, diversified portfolio through investments in attractive, long-term opportunities across sectors and asset classes at both the domestic and international level. Working alongside global strategic partners and renowned investment managers, PIF acts as the Kingdom's main investment arm to deliver a strategy focused on achieving attractive financial returns and long-term value for the Kingdom of Saudi Arabia, in line with the Vision 2030.

The Public Investment Fund Program (2018–2020), part of the Kingdom's Vision 2030 Vision Realization Programs, acts as a roadmap for the next three years to strengthen PIF's position as the engine behind economic diversification of the Kingdom and its role in transforming Saudi Arabia into a global investment powerhouse. The program will see the Fund's Assets Under Management increase to over \$400 billion by 2020 and outlines how PIF aims to complement private sector development in the Kingdom through its new domestic investment, split between the Fund's Saudi Holdings, Saudi Sector Development, Saudi Real Estate & Infrastructure Development, and Saudi Giga-Projects.



The Russia-China Investment Fund (RCIF)

is a private equity fund that aims to generate competitive returns by investing in projects that advance bilateral economic cooperation between Russia and China.

The Fund was established in June 2012 by two government-backed investment vehicles—the Russian Direct Investment Fund and China Investment Corporation (CIC).

The fund received \$2 billion in commitments from RDIF and CIC in equal share, with an additional up to \$2 bn expected to be raised from international institutional investors.



The Russia-Japan Investment Fund (RJIF) was established to pursue and implement attractive investment projects to promote economic, trade and investment cooperation between Japan and Russia.

The Fund was founded in August 2017 by the Russian Direct Investment Fund (RDIF) jointly with the Japan Bank for International Cooperation.

Priority sectors identified for cooperation include healthcare, development of smart cities and sustainable technologies, energy sector, cutting-edge technologies, developing industries and exports in the Russian Far Eastern District, as well as other initiatives that will strengthen trade and economic relations between the two countries.

PLAYING WITH THE SHADOW

MIKHAIL PIOTROVSKY

CEO, the State Hermitage

The State Hermitage has always been regarded as one of the world's most innovative museums. The idea behind the Hermitage from its very beginning was to make it an international museum which exists in a global context.

The Empress Catherine the Great bought contemporary art in Europe, while Peter the Great was an avid admirer of modern technology. Today's art exhibitions in the Hermitage are deeply rooted in this historical tradition.

Modern technology can assist creators. Technology is a shadow, which should from time to time be told "Shadow, know your place" as in the play by the Russian writer Evgeny Schwartz. This shadow cannot fully replace the creative process, but it can make it a lot more versatile and multi-faceted.

The time has now come for a serious conversation about the role of artificial intelligence in the development of new trends in contemporary art. And there is already much to say.

Art created with the help of artificial intelligence is not a game of the mind but a serious reflection on the humanization of science.

Artificial intelligence can compete with an artist but it will not necessarily win. A good artist will defeat artificial intelligence, a poor artist will lose.

The Artificial Intelligence and Intercultural Dialogue exhibition is a place where artists from different countries compete and cooperate with artificial intelligence. This exhibition brings together two historical objectives of the State Hermitage — promoting innovation in art and advancing cultural dialogue.

We are delighted to cooperate with the Russian Direct Investment Fund (RDIF) in realizing these objectives. Together with RDIF, we have brought together the most innovative artists from around the world.

Many of them will be a surprise for the visitors of the Hermitage, for example, two female artists from Saudi Arabia. Artists in the Arab world often use the alphabet and numbers, and one can see the tradition of medieval Arabic mathematics in their works.

In the Muslim world, abstract art has always been more easily accepted than in the Christian one. That has made Arab artists more open to using new forms and technologies. As a result, new art often comes from the East.

Our compatriot, Nobel laureate Konstantin Novoselov brings to modern art a new creative impulse ignited by his talent as a scientist. Novoselov lives in two worlds and thinks about how people create and how ideas are born. He has mastered the art of tracing the birth of a thought through his secret signs and writing.

The 21st century is the age of the humanities. New discoveries in hard sciences require a heavenly revelation rather than an ability to use a slide rule or even artificial intelligence algorithms.

Our century needs not only new technologies in art but also principles of art in technology and science. The humanization of technology has become vital for the very survival of mankind.

CLOSER TO EACH OTHER: FROM DIALOGUES OF CULTURE TO INVESTING IN FUTURE

KIRILL DMITRIEV

CEO, the Russian Direct
Investment Fund

The development of global intercultural dialogue is an important long-term mission for the Russian Direct Investment Fund. This year, the Fund and The State Hermitage Museum present the Artificial Intelligence and Intercultural Dialogue exhibition dedicated to the creative capabilities of Artificial Intelligence (AI). The exhibition is taking place during this year's St. Petersburg International Economic Forum (SPIEF).

The exhibition at the Hermitage is part of RDIF's new initiative to promote dialogue between cultures and create the trust needed for successful trade and investment. For this exhibition, we brought together artists from across the world, all of whom use AI technology.

RDIF and its international partners are already investing in AI technology, which experts say could add \$13tn to the global economy by 2030, dramatically transforming a range of sectors. Many countries are already developing their own AI programs.

Experiments with AI in art, traditionally a sphere where human intellect had a monopoly, are a new trend in the development of AI technology. The artworks in the exhibition are a synthesis of art and modern science.

French art group Obvious, whose works made AI-based art popular, are exhibiting in Russia for the first time. We welcome artists from China, Saudi Arabia, Japan, Italy, and other

RDIF partner countries. We are also proud to present the works of our fellow countryman, world-famous scientist Konstantin Novosyolov, whose art explores the secrets of creativity.

We are witnessing the creation of a new art form. Our hope is that through this art, people from different nations will better understand each other. We are delighted that this exhibition of the world's best AI art is taking place at the Hermitage, one of the world's most renowned museums. This exhibition underlines Russia's cultural and technological leadership.

ARTIFICIAL INTELLIGENCE AND INTELLIGENT ART

DMITRY OZERKOV

Curator of the exhibition,
Head of the Contemporary
Art Department,
the State Hermitage

On October 25, 2018, the painting “Portrait of Edmond de Belamy” was sold at Christie’s in New York for \$432,500. This painting was created by an AI algorithm under the supervision of the Parisian Obvious Art Collective. The high profile sale of this painting marked global acknowledgment of the meeting of two worlds — art generated by human intelligence and intelligence created by artificial means.

AI intelligence empowers us to perform increasingly complex tasks. These include tasks traditionally considered creative and belonging to the human domain. The increasing complexity of tasks that we set for machines requires a creative approach to solving them. Now, in addition to regular calculations, artificial intelligence is able to perform intellectual actions characteristic of humans.

This new reality poses several questions: is a full-fledged intellect a purely biological phenomenon or can it be constructed by other means? Can a “flexible adaptation” of a machine create a comprehensive mental

ability? Is it possible to reduce our thinking to a sequence of computational actions with different degrees of complexity?

Originally created by humans, artificial intelligence could now be considered as one of many human “tools” used to create art. Self evolving, AI progresses from solving simple problems posed by a human, to the setting of tasks by itself, elevating its ability to a whole new level. Its development is not entirely controlled by people, which emphasizes the need to discuss the rights and duties of AI. Today, this is a legal reality.

Until now artificial intelligence has appeared to lack the capacity to generate creative emotion, inherent to biological intelligence. Could artificial intelligence learn to imitate the creative emotion of biological intelligence, and in doing so surpass it? Correspondingly, another question arises: can the mental process of an artist be translated into the language of mathematical calculations, perhaps infinitely complex ones? And, as a result, can a work

created by artificial intelligence, imperceptibly (or deliberately) become part of the “human” history of art?

Artificial intelligence raises many questions. Distrust still remains. Computers have long been generating crosswords for daily newspapers, when will they be able to create an exciting thriller movie? Or could they already?

Different countries deal with these issues in different ways, both at the technological, ethical, and legislative level. Society needs living art in order to face the most difficult challenges of our time. It is contemporary artists and philosophers who will have to resolve questions relating to the activity of artificial intelligence in the near future.

Today, we reflect on the future of artificial intelligence in the world of art—in one of the world’s leading museums, the State Hermitage Museum.

WHY DO ARTISTS STUDY ARTIFICIAL INTELLIGENCE?

VICTORIA KONDRASHOVA

Curator of the exhibition,
CEO, the Aksenov Family Foundation

Modern art has always been concerned with the issues of information transfer through language and communication between an artist, a subject of art, and the audience.

A classical system of interaction clearly sets boundaries: works of art exist in a closed world of inner values, leaving a viewer with only an observer function. Early in the 20th century, avant-garde artists rejected this position: they denied the independence of art and suggested redefining the existing roles. Working with the topic of artificial intelligence once again raises questions about the boundaries between participants in the process of creating and consuming art.

The Artificial Intelligence and Intercultural Dialogue exhibition includes works by 14 artists from 12 countries who turned their attention to creative and scientific developments in the field of artificial intelligence, and offers a new perspective on the relationship between an artist and a viewer.

In *Memories of Passersby*, Mario Klingemann (Germany) casts doubt on the important principle of completeness. Two screens display an endless stream of portraits that are created

in real time by an absolutely autonomous program. This strange conception of faces appears as a result of the machine processing of thousands of portraits painted in the 17th–19th centuries.

The Obvious Art Collective (France) used a base of 15,000 works by old masters to make portraits of the Belamy family. The images have been proved new by the system (GAN), and whilst the plausibility of images is not even questioned, although the Belamy family never existed. Nonetheless, the work itself is a print on canvas that looks quite common.

Installation Time by the Nobel laureate and inventor of graphene Kostya Novoselov (Russia/United Kingdom/Singapore) also draws attention to the process of creation. Here, a viewer observes how artificial intelligence learns to recognize water. However, the ability of the neural network to learn is juxtaposed here with the unpredictability of human decisions and even human fate — these philosophical topics all find expression in graphic sheets made with graphene ink.

Under the supervision of the artist Sun Xun (China), students made one hundred thousand

woodcuts following traditional Chinese techniques. These works are digitized and uploaded into the database of a machine, which converts them into animated images that can be seen through 3D glasses. Such modifications tell the audience about the irreversibility of time and how important it is to preserve traditions in the long run.

Lulwah Al-Homoud (Saudi Arabia) focuses her interest on the theme of recognition. She employs an algorithm to create a universal visual language. The database of her project incorporates classical Arabic ligature and Vedic square, and the results of processing are abstract and intuitively perceived graphic images.

Norimichi Hirakawa (Japan) explores the boundaries of human sensations. The artist translates standard parameters of 3D space into their color-sound equivalent. While working with classical principles of correlation and correspondence, he creates a new artistic image visualizing something familiar by transforming space into a data-driven format.

DEFINING AI ARTS: THREE PROPOSALS

LEV MANOVICH

Professor

The Graduate Center,

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1.

At first, providing a definition for “AI arts” does not appear to be difficult. AI (an abbreviation for the term “artificial intelligence”) refers to computers being able to perform many human-like cognitive tasks, such as playing games of chess and Go, recognizing content in images, translating between languages, selecting best candidates in a job search based on their CVs, and so on.

By this logic, “AI arts” suggests that we program computers with a significant degree of autonomy to create new artifacts or experiences that professional members of the art world would recognize as belonging to “contemporary art.” Or, we can teach computers the skills of artists from earlier historical periods, and expect that historians recognize new artifacts created by computers as legitimate art from these periods. In fact, we can extend the famous Turing test to AI arts. If art historians confuse objects created by a computer with the original artifacts from some period, the computer passed “Turing AI arts” test.

This sounds simple and logical. According to this definition, art created by an AI refers to artifacts that professionals recognize as valid historical or contemporary art.

Unfortunately, this logical approach is not sufficient. On closer inspection, its clarity dissolves. For example, there is no commonly accepted definition of “art” today among professionals such as art critics, art theorists, philosophers of art, or sociologists of culture. So how can we program a computer to independently create something which we can’t even define?

2.

We will now try another approach. Let’s consider the process of the creation of new artifacts. Since the 1950s, computers have been used in arts in variety of ways. Is there a clear difference between computer arts (or digital arts) and “AI arts” (that currently means the use of machine learning and deep neural networks)?

Machine learning using neural networks includes a number of methods, and some of them were adopted for generation of cultural artifacts. In one approach, a single network is trained using a large set of examples, such as images in one style. After the training, the network can itself generate new images in the same style. In another approach called GAN (Generative Adversarial Network), the generation of new artifacts involves two networks. One trained on a set of examples creates new artifacts. These artifacts are evaluated by the second network. Another method is called “style transfer.” Here the network learns how to transfer a style from one set of images to new images — for example, a “van Gogh style” to a photograph.

All these methods differ from the methods of computer art and design developed earlier. Now, we don’t program a computer to generate new objects using a sequence of steps,

a system or rules, or in some other way that we have to specify in all details. Instead, a network itself extracts deep structure from a set of cultural artifacts and then itself generates new artifacts. Does this mean that we finally have real “artistic AI,” the true “art intelligence”?

Maybe not yet. There are at least three moments where a human makes choices and controls computer’s operation in this process. First, a human designs network architecture and also an algorithm for network training (or selects it from the existing ones). Second, a human creates a set of examples used for this training. Third, a human selects what he or she feels are the most successful artifacts from everything the network generates.

Therefore, we can’t claim that the generation of cultural artifacts using machine learning and neural networks is more “intelligent,” i. e. shows higher levels of autonomy than any other computer art method. All these methods also include human decisions, choices, and development of algorithms.

So, machine learning is no more an advanced form of artistic AI than the geometric drawings of the first computer artists, cellular automata artworks, or many interactive computer-driven installations.

We arrive at a conclusion that all methods that use computers to create objects and media are equally valid parts of “AI arts”. What defines whether something is AI is not a method, but the amount and type of control that we exercise over the algorithmic process.

3.

For our third attempt at a working “AI arts” definition, let’s focus now on the the core idea of machine learning using neural networks — the computer automatically extracts common patterns from a group of artifacts. After this, the network can be used to generate new artifacts with the same patterns. How interesting is this paradigm for the arts?

Cultural artifacts that people were creating for many thousands of years have one common characteristic: cultural expressions created in one area, in one period or by one group share some common patterns. Their ornaments, clothing, decorations, designs, music — they all have a “style,” i. e. a system of rules and constraints that they follow. The system defines what is possible within a given style, what is less likely, and what is impossible. The existence of style is a universal characteristic of human culture, and therefore styles of artifacts are used by archeologists to date periods of civilizations’ development.

When we teach computers to extract patterns from large sets of artifacts in a single aesthetic system, and then generate new artifacts that belong to the same system, it is not a new step for the arts. We are forcing computers to create like we did for tens of thousands of years. In my opinion, it would be more radical to use computers to break away from this meta pattern of human culture. Let’s teach computers do something we humans can’t — move between different systems and aesthetics.

So this is, then, my final definition of AI arts. It is the art that humans can’t themselves create. It is objects, media, and situations and experiences that do not have the usual systematicity and predictability of human arts. This art does not exist, but we can use computers to create it.

DEFINITIONS

Artificial Intelligence

A property of intelligent systems to perform functions (primarily creative) which are traditionally viewed as human domain. The same term defines a scientific discipline which is engaged in modeling sensible behavior. At the same time, the methods of artificial intelligence not only plausibly imitate human activity, but employ all actual computer capacities. The structure of the intellectual system includes three main blocks—a knowledge base, a reader, and an intelligent interface.

AI Art

The art of artificial intelligence. Works of art created by artificial intelligence. In these instances a person is only to launch the program—further on the algorithm then proceeds to operate independently.

AI-based Art

Art based on artificial intelligence. A conventional term for the works of art which artists have created using computer algorithms as the main tool. There is currently an ongoing debate as to whether an artificial intelligence can become or be considered an independent artist in its own right or whether it remains a means for implementing artistic ideas (AI-based art).

Neural Network

Is a united system of simple interacting processors—artificial neurons. The concept of this united structure evolved from the concept of biological neural networks that make up the nervous system of a living organism. Having adopted a similar principle, a machine acquires the ability to analyze and memorize information, and then reproduce it from memory if necessary. Each network unit deals with only one type of signal, but being connected, simple processors can perform the most complex tasks and even learn.

Machine Learning

One of the core differences between artificial intelligence and ordinary software lies in the ability to learn. This requires special methods of constructing algorithms that deal with data mining. Thus, the task of the machine learning is not an immediate use of a ready-made algorithm, but an independent training in solving the set tasks.

Algorithm

An algorithm is a sequence of commands, the execution of which enables a computer to solve a task. Any computer should understand the algorithm must have the following properties: discreteness, definiteness, finiteness, universality, and effectiveness.

GAN

Generative-adversarial Network

Is an algorithm for a machine to learn without a trainer, built on the interaction of two models. The generative model analyzes a proposed database and depending on the outcome creates completely new, unique objects. The adversarial model, or the discriminator, tries to distinguish the objects created by the generator from those included in the original database. The success of the first model relies only on the failure of the second one. Since the two models have opposite goals, they influence each other and train in the process of interaction.

CAN

Creative-adversarial Network

A type of generative neural network designed to create. The generator makes up new original works, and the discriminator compares them with the existing database and tries to attribute it to one style. Thus, the generator learns to create works that will fit into the logic and parameters of the available samples, but not match any style familiar to the neural network.

Data Sculpturing, Data Painting, etc.

It is not just algorithms that can serve as tools for artists, but the data itself. The data is visualised in one or another aesthetic form, becoming an independent artwork.

Robotic Art

A type of kinetic art that presents works in various styles, which use robots to create images or implement ideas.

CGI**Computer-generated Imagery**

Computer-generated imagery is created with the help of three-dimensional computer graphics and then used in works of art, as well as in computer games, movies, and so on. Usually, there is a real prototype (portrait, photo, drawing, video) taken as a foundation, and a computer builds onto the real prototype, according to the task.

Algorithmic Painting

Algorithmic painting is a visual image created by an algorithm or using an algorithm. In fact, the algorithm serves as an artist's brush, and the work occupies an intermediate position between painting in a classical sense and video installation.

Visual Synthesis

The term is borrowed from the realm of data visualization, where it implies visual organization of information using algorithms. In order to achieve a visual effect, artists combine the results of an analysis conducted by certain algorithms with visual images generated by other algorithms.

Data Processing

A systematic sequence of operations performed by data in order to obtain new information by means of calculation. Data processing underpins almost any algorithm that artificial intelligence works with.

AI-driven Recommendation Engine

A recommendation service, built on artificial intelligence that analyzes a huge database and compares each sample with preset preferences. It differs from the usual recommendation tool due to its self-training skill and the option to improve the recommendation distribution during the process of an operation. This mechanism underpins dating sites and social networks.

Dataset

It is a set of data (or samples) united by a common property. The database is the starting point for algorithms' work.

E-paper, e-ink

Electronic paper and electronic ink are a technology that display information and imitate the physiological conditions necessary for the creation to be perceived as regular. A display of this nature is visually similar to its analogue counterpart due to the low degree of eye fatigue and the illusion of image depth. Developers are also trying to increase the flexibility of the technology. However, it has important differences — firstly, it works on the basis of electrophoresis and, secondly, its ability to change images printed with electronic ink. E-books are the main, but not the only area using this technology.

Turing Test

An experiment introduced by the British machine intelligence researcher Alan Turing in 1950. It involves two people and one computer: one person is an evaluator, and the second answers his or her questions on an equal basis with a computer. If the evaluator cannot definitely distinguish which of the interlocutors is a computer, i.e. the computer misled the evaluator, then it is considered to have passed the test.

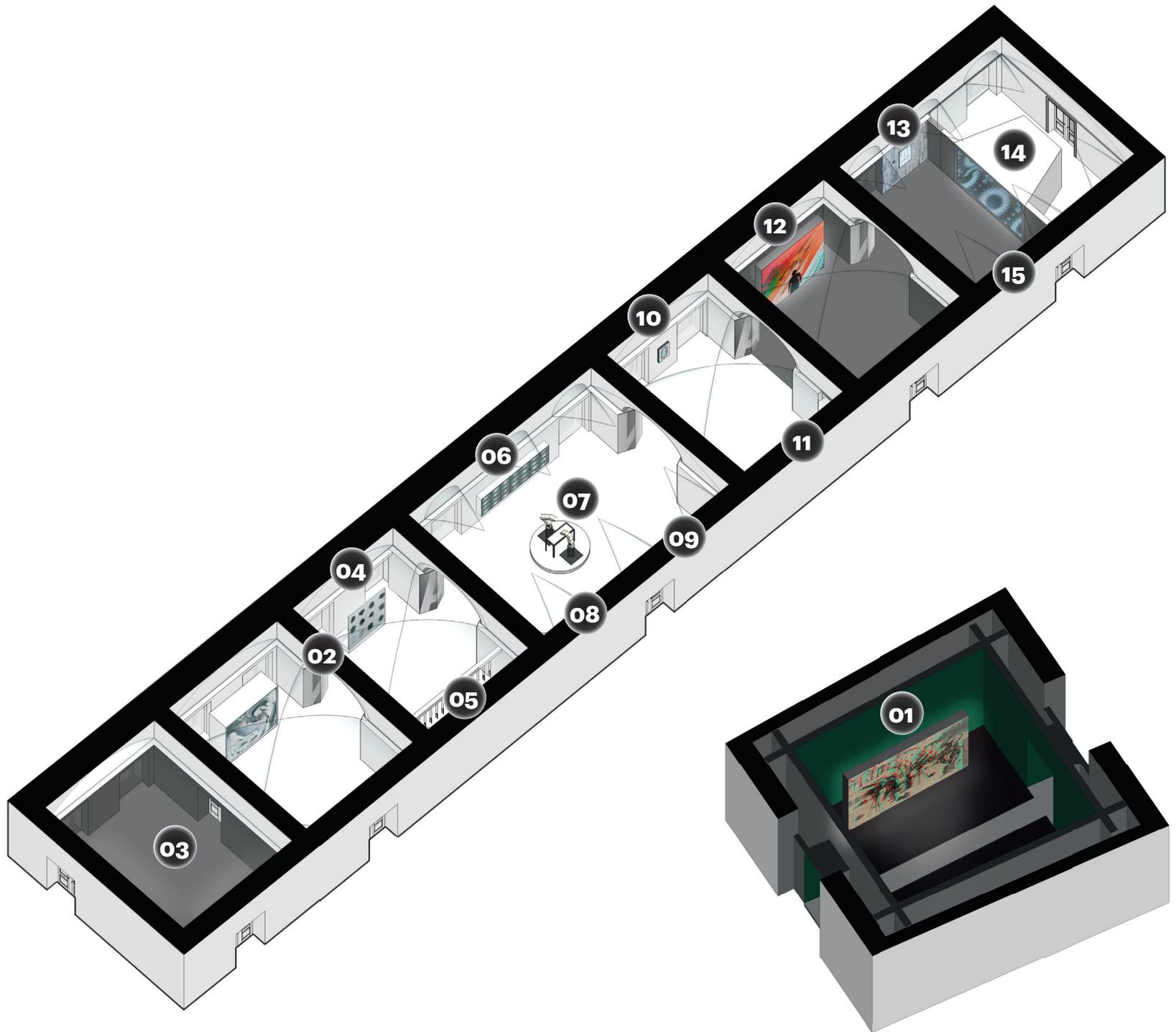
Glitch Aesthetics

The concept that describes the use of glitch in digital art. Glitch is defined as a fault in a machine or equipment that stops its operation. As applied to art, this fault may be more or less predicted and happens due to the destruction of a digital code or when electronic devices are physically interrupted in operation.





PLAN



01.
TIME SPY
Sun Xun

02.
**MEMOIRS FROM LATENT SPACE
STUDY II**
Refik Anadol

03.
**JARDINS D'ÉTÉ
QUAYOLA**

04.
CHINA INK
Egor Kraft

05.
LOW PRESSURE CALCULATIONS
::vtol::

06.
SAWTAN
Daniah Al Saleh

07.
**MAKING ART FOR STOCK
MARKET**
Teamvoid + Youngkak Cho

08.
WONDERERS OF UKIYO
Obvious Art Collective

09.
**THE BELAMY FAMILY
PORTRAITS**
Obvious Art Collective

10.
THE PALACE
Jonathan Monaghan

11.
MEMORIES OF PASSERSBY
Mario Klingemann

12.
DATUM
Norimichi Hirakawa

13.
TYPEFACE
Aaajiao

14.
BEING AND EXISTENCE
Lulwah Al Homoud

15.
TIME
Kostya Novoselov
Together with ZHESTKOV.STUDIO

THE GENERAL STAFF BUILDING. A HISTORICAL CONTEXT

The *Artificial Intelligence and Intercultural Dialogue* exhibition takes place in the General Staff Building of the State Hermitage Museum, the largest museum in Russia and one of the world's leading museums, with more than 3 million items displayed throughout its 230,000 square metres of space.

The spectacular, crescent-shaped neoclassical General Staff Building was designed by Carlo Rossi, a famous Russian architect of Italian descent. The building was built by decree of Emperor Alexander the First between 1816 and 1829 to house the core ministries and the General Staff in immediate proximity to the Emperor's Palace (the Winter Palace). The unique building with its central triumphal arch is recognized as one of the best examples of Empire-style architecture in Russia.

The east wing, also known as the Building of Civil Ministries, became part of Russia's largest museum in 1988.

In 2014, the Hermitage opened new halls for visitors in celebration of its 250th anniversary. Part of the permanent exhibition is devoted

to the history of ministries: the Ministry of Foreign Affairs and the Ministry of Finance. Another part that moved here from the State Hermitage's Winter Palace is comprised of Impressionism and Post-Impressionism masterpieces, including works by such famous artists as Claude Monet, Pierre-Auguste Renoir, Henri Matisse, Paul Cézanne, Edgar Degas, Paul Gauguin and Pablo Picasso as well as the collection of Russian contemporary art including works by world-renowned Russian avant-garde artists Wassily Kandinsky and Kazimir Malevich.

In addition, the *Hermitage 20/21* project is being implemented inside the General Staff Building. The main goal of this project is to establish a dialogue between old and new art through advanced contemporary art exhibitions.

Dialogue is the perfect word to describe the very spirit that reigns inside the civil ministries' buildings. After all, it was here that the foreign policy department of the Russian Empire was created and developed during the period dubbed as the "Golden Age of Russian Diplomacy".

The Minister of Foreign Affairs held the status of chancellor of the empire and played a major role in all political matters.

From 1829 to 1917, 11 ministers managed the ministry, while it was located in the Palace Square. At the start of the 20th century, Russia had diplomatic relations with 47 countries and more than 300 overseas offices.

Another significant task of the ministry was to maintain consistent archives of national documents. The Main Archive of the Ministry of Foreign Affairs, a kind of database of Russian history, used to be located in the enfilade, which the *Artificial Intelligence and Intercultural Dialogue* exhibition now occupies.

For thousands of years, collection and processing of information was the prerogative of humans. Today, these processes are performed with the help of digital tools. Artificial intelligence draws more and more conclusions independently. Moreover, it learns from its own experience and sometimes does so much faster than a person.

Historians and futurologists claim that, in the near future, robots or more complex forms of artificial intelligence will perform many of the usual human functions. Optimists among researchers say that people will integrate these high-tech tools into their everyday lives, which will provide them with more time for self-development. People will discover the finer aspects of their intellect and turn to their emotions, which are by definition beyond the scope of algorithms.

Whatever the consequences of such rapid technological development, one thing is clear: the universal language of AI facilitates interaction between national cultures but, at the same time, raises new challenges. There is an opportunity for a platform for a new dialogue between the culture of innovation and the culture of tradition.

TIME SPY

SUN XUN
(CHINA)

The *Time Spy* video installation is devoted to the concept of time. In his attempts to interpret time, Sun Xun trained AI using a variety of prints with traditional images of the Chinese culture. By studying and comparing them, the algorithm revived pictures and created a fascinating 3D animated film.

For each shot, there was a woodcut created. Under the artist's supervision and with the help of his sketches, hundreds of art students made 100,000 woodcuts by hand in a traditional Chinese technique, which requires maximum concentration and does not allow mistakes. Xun claims that he especially values this type of print for its straightforwardness and irreversibility. Each piece was digitized and converted to 3D so that the machine algorithm could process images and turn data into animated pictures.

People and artificial intelligence produced a surrealistic tale of a stolen time that has violins with wings, mechanical horses, gothic architecture, and five elements (metal, wood, water, fire, and earth). The confrontation of the natural and mechanical manifested itself with images and was enhanced with a collision of methods—traditional engraving and computer data processing. Sun Xun employs juxtaposition of analog and digital techniques in order to raise important topics of the times. As the artist explains, “time cannot be seen or touched, but it still remains the basis of our existence.” And paradoxical combinations are necessary when it comes to our complex relationship with time and the study of history.

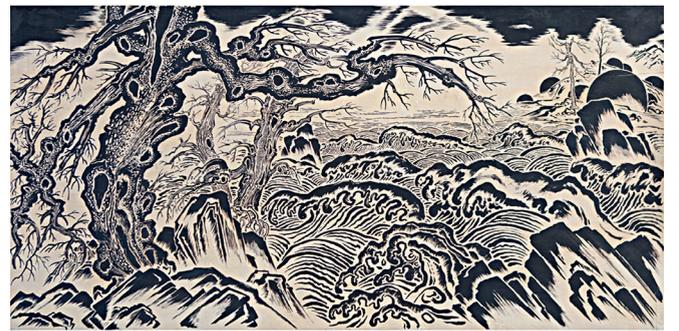
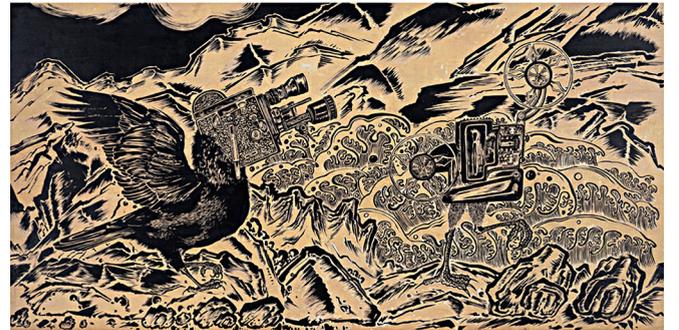
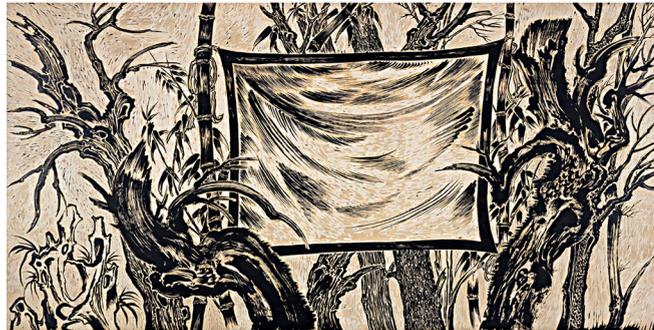
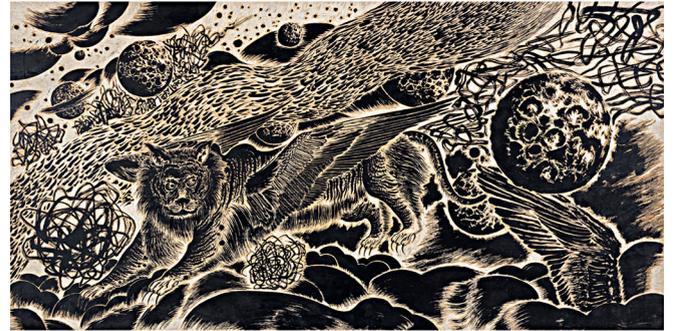
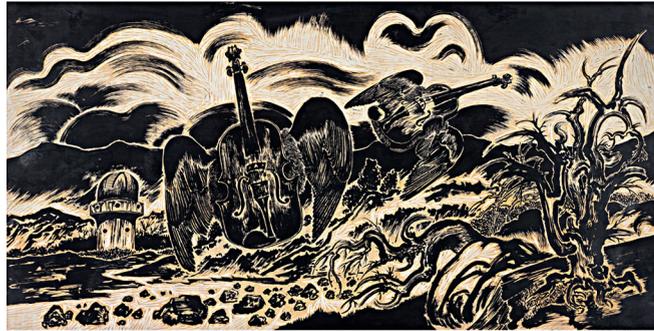
The *Time Spy* installation was designed as part of a larger multimedia project *Reconstruction of the Universe* in 2016. In summer 2017, the film was presented on huge screens at Times Square in New York.

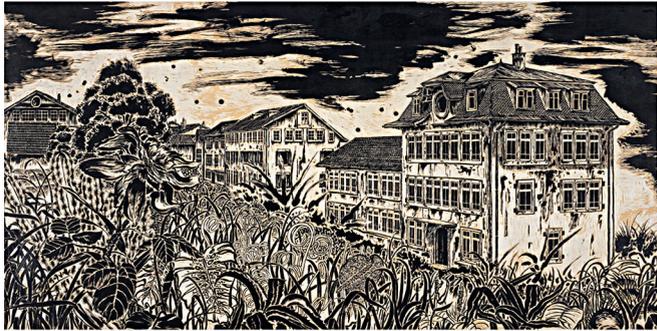
Sun Xun (born 1980, Fuxin, China) is a multimedia artist who combines ancient and modern artistic techniques. His works are best known for thorough execution and complexity. Sun Xun took part in exhibitions at the Solomon R. Guggenheim Museum and Metropolitan Museum

(New York, USA), Hayward Gallery (London, UK), the 7th Liverpool Biennial (Liverpool, UK), etc. He was a prize winner at the Chinese Contemporary Art Awards (CCAA Best Young Artist), Taiwan Contemporary Art Link Young Art Award, and others.

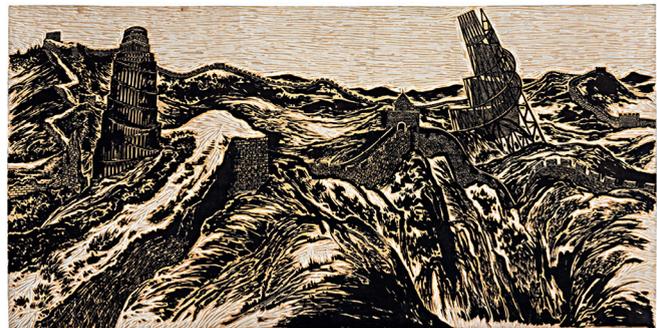


Sun Xun. Time Spy. 2016
Video installation
Screen, projection, 3D glasses
Commissioned by Audemars Piguet





Sun Xun. Time Spy. 2016
Video installation
Screen, projection, 3D glasses
Commissioned
by Audemars Piguet



MEMOIRS FROM LATENT SPACE STUDY II

REFIK ANADOL
(TURKEY / USA)

Memoirs from Latent Space Study II explores the relationship between memory and dreams, recognition and perception. Utilizing artificial intelligence, the 4K video reveals the space in the mind of a machine. The collective artifacts aim to illuminate the seemingly unknowable. In this particular instantiation, Refik Anadol trained the newest algorithm of the generative-adversarial network (GAN) in 1.3 million images of architectural photographic memories from the buildings of nine architects and 11 different historic eras, hallucinating a synthetic space yet reachable by humankind. The network analyzed a huge architectural heritage and generated unique images of many facades. These buildings do not exist and have never existed; instead, they were invented by AI, now looking fascinating and phantasmagoric.

The images of fantastical buildings follow each other on the screen, and the viewer sets off for an imaginary cartographic journey, where the neural network is a leader. Anadol describes his work as the first example of three-dimensional machine hallucinations. Through a special “vision” that AI has the artist tries to examine hidden spaces in architecture and to show something that is beyond human perception, but can be easily discerned by the machine.

Anadol views the facades of the buildings as “canvases” for a media artist, and in this installation such an approach becomes exaggerated: now architecture is his “brush.” The algorithm treats the world heritage impartially: it analyzes images by a variety of parameters and draws its own conclusions, but does not feel thrilled before the masterpieces. Human perception is different. According to the artist, such spaces could exist if we had a different history. Perhaps, AI shows a part of this history on the screen.

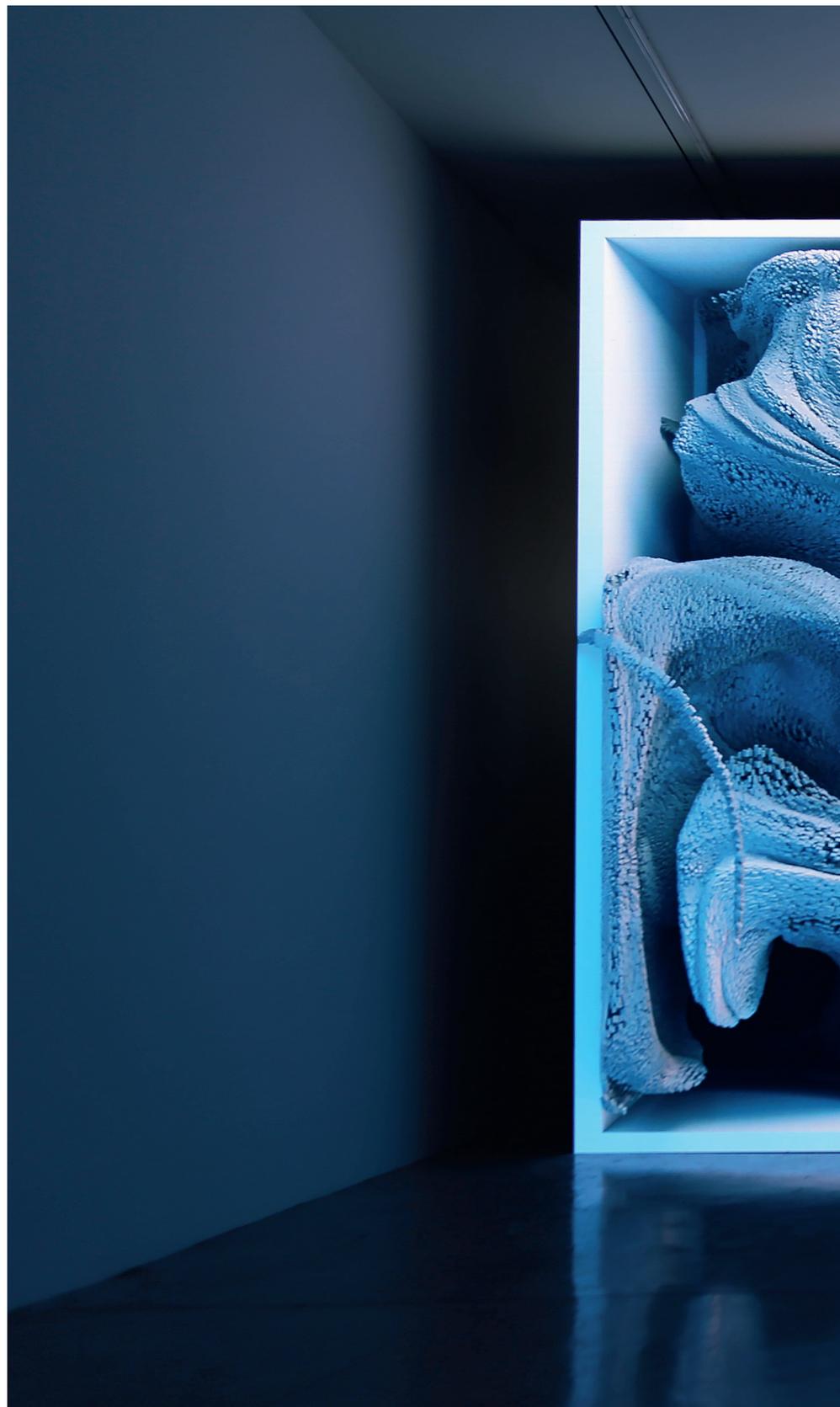
Refik Anadol (born 1985, Istanbul) is a media artist. He studies architecture and memory with the use of artificial intelligence. He works with media and public art and creates data sculptures and spatial installations, and audiovisual performances. He is particularly interested in exploring space among digital and physical entities. By merging architecture and media-art he predicts the future of architecture

in a completely digital reality. His works were exhibited at Hammer Museum (Los Angeles), International Digital Arts Biennial Montreal (Montreal), Ars Electronica Festival (Linz), Istanbul Design Biennial. Refik is a winner of Microsoft Research's Best Vision Award, German Design Award, University of California Institute for Research in the Arts Award, Google's Art and Machine Intelligence Artist Residency Award.



Refik Anadol. *Memoirs from Latent Space Study II*. 2019
4K video, custom wood frame,
computer
30 min loop
Ed 5, 1 AP
Courtesy of *bitforms gallery*, New York

Refik Anadol. *Memoirs from Latent
Space Study II*. 2019
4K video, custom wood frame,
computer
30 min loop
Ed 5, 1 AP
Courtesy of *bitforms gallery*, New York





JARDINS D'ÉTÉ (SUMMER GARDENS)

QUAYOLA
(ITALY)

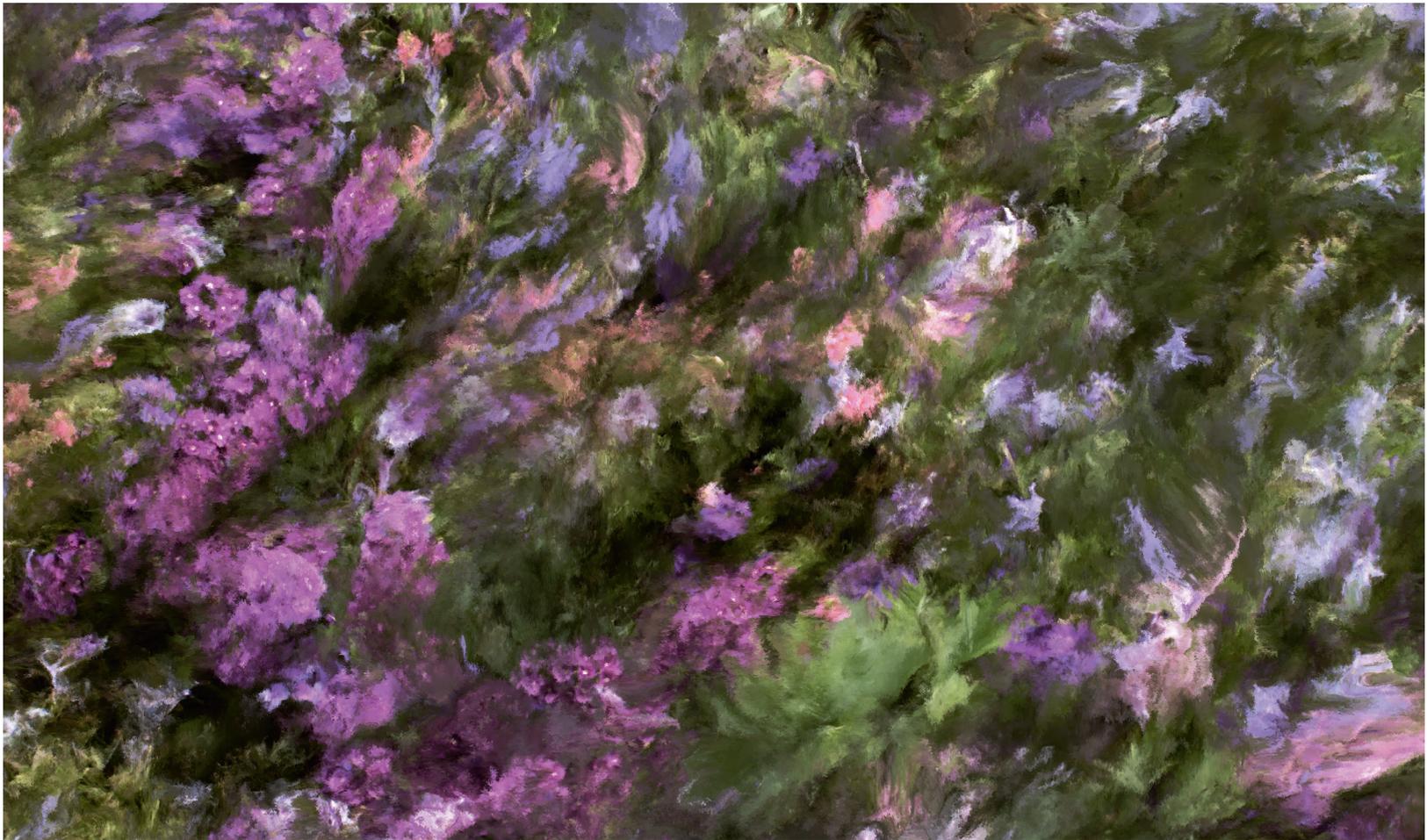
Jardins d'Été is QUAYOLA's homage to French Impressionism, especially the late works of Claude Monet. In the 19th century, the achievements of chemical industry contributed to the evolution of a new direction in art: there appeared paints in tubes which opened up a technical possibility to convey spectacular spontaneity of nature on canvas. Modern technologies allow not only to capture the spontaneity, but also to generate it in front of the audience. QUAYOLA is attracted by artificial intelligence that can show those subtle nuances of reality beyond human perception, which only a machine can discern.

Floral compositions manipulated by high winds are filmed at night when contrast and depth of shades are especially expressive. QUAYOLA employs complex computer algorithms that analyze motion, composition, and color schemes in these shots. By means of visual synthesis, the machine processes macro shots to single out abstract paintings whose colors and tone allude to impressionist paintings.

The installation fills the entire room, and the viewer immerses into the landscape and witnesses the transformation of realistic pictures into abstract landscapes. The perception of an image by AI is different from the subjective human impressions, and this enables the machine to create a new algorithmic type of painting.

QUAYOLA (Davide Quayola, born 1982, Rome) is a visual and sound artist. He investigates dialogues and the unpredictable collisions, tensions and equilibriums between the real and artificial, the figurative and abstract, the old and new. In his works, he redesigns traditional world art imagery by means of computer technologies. Ancient Greek sculptures, masterpieces of old painters or baroque architecture can become starting points for his works.

His pieces were exhibited at Victoria and Albert Museum (London), British Film Institute (London), Park Ave Armory (New York), BOZAR Center for Fine Arts (Brussels), Palais de Tokyo (Paris), and lots of other museums and galleries. QUAYOLA is a winner of numerous prestigious awards including Golden Nica Award at Ars Electronica Festival (Linz, Austria), the most important festival of media art in the world.



QUAYOLA. Jardins d'Été (Summer Gardens). 2016
Installation
Screens, projection, video
Courtesy of *bitforms gallery*, New York

QUAYOLA. Jardins d'Été (Summer Gardens). 2016 →
Installation
Screens, projection, video
Courtesy of *bitforms gallery*, New York





CHINA INK

EGOR KRAFT
(RUSSIA)

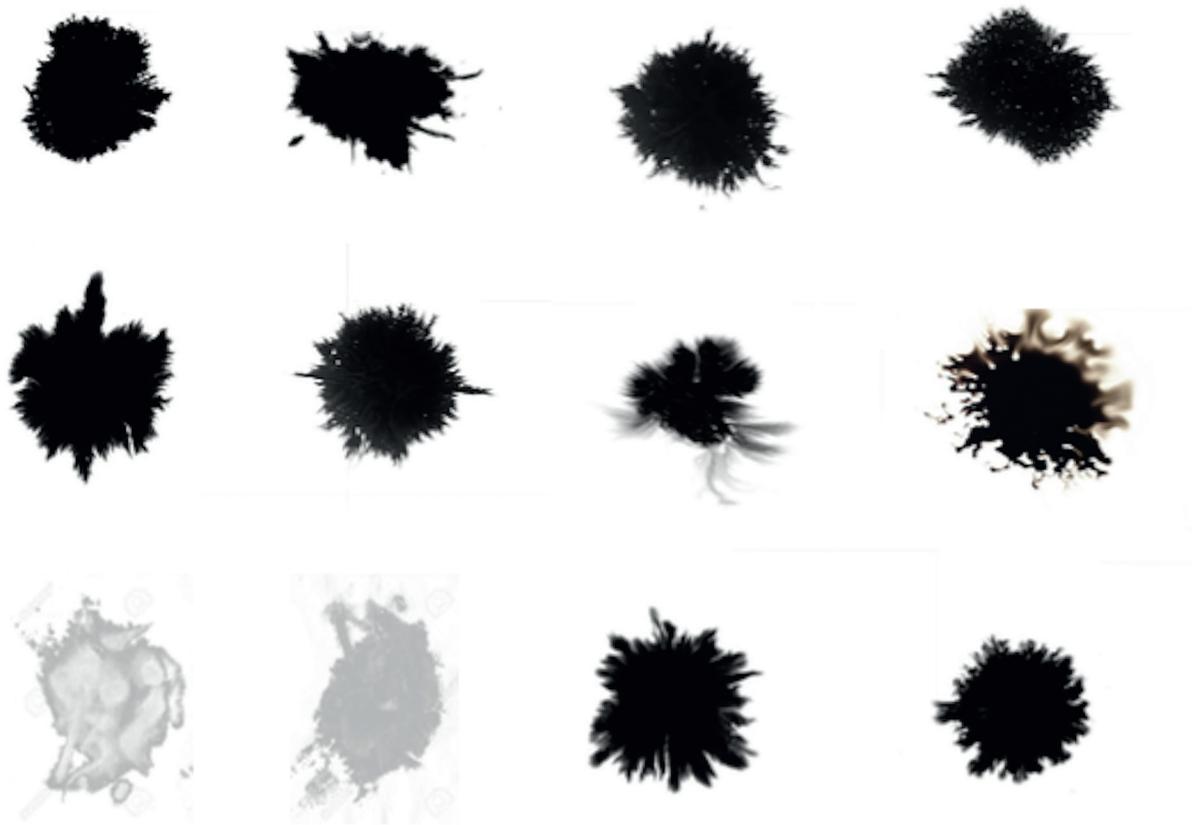
In the *China Ink* installation, artist Egor Kraft establishes a dialogue between tradition and technology using artificial intelligence. He turns to the Chinese tradition of using ink for calligraphy. Albeit, the artist is not interested in writing technique, style, or iconography, but in the ink itself and special paper.

Special ink of the highest quality pressed into shiny tiles is grinded into water to achieve the desired consistency and shade. Preparation of ink is an integral part of the calligraphy process, and its interaction with wet, grainy paper has become a matter of peculiar admiration.

The artist supplied to a generative-adversary network (GAN) a database of several thousand inkblots created by the spread of China ink on calligraphic paper. And the algorithm

continued to make images of blots, now electronic ones, but still unique and inimitable. It draws with electronic ink (e-ink) on electronic paper (e-paper). This technology is designed to imitate ordinary paper, but instead of a sheet there is a special screen, on which an image is formed in the indirect light.

Now such displays are produced in modern China, as there they once started creating ink and paper for calligraphy. Now the economic circumstances and the rhythm of life have changed, technologies face new challenges. Egor Kraft explores simulations of artistic techniques and stylization using artificial intelligence and shows how culture and tools influence each other at all stages of human development — and how complex this process is.



Egor Kraft. China Ink. 2019
Installation
Electronic paper, electronic ink
Courtesy of the artist

Egor Kraft (Georgy Kraft, born 1986, Russia) is a media artist and researcher. He works in the realm of media, science, critical research, philosophy, and art. He took part in biennial exhibitions and festivals, including the 5th Moscow Biennale of Young Art, Ars Electronica (Linz), WRO Biennale of Media Art (Poland), IMPAKT festival (Utrecht), Cyfest

(USA / Russia), etc., as well as group exhibitions worldwide. Egor Kraft held four personal exhibitions in Sweden, Russia, Estonia, and Berlin. In 2017, the artist was included in the New East list of 100 people, places and projects from Eastern Europe that influence our world today according to the British magazine *Calvert*.

LOW PRESSURE CALCULATIONS

::VTOL::
(RUSSIA)

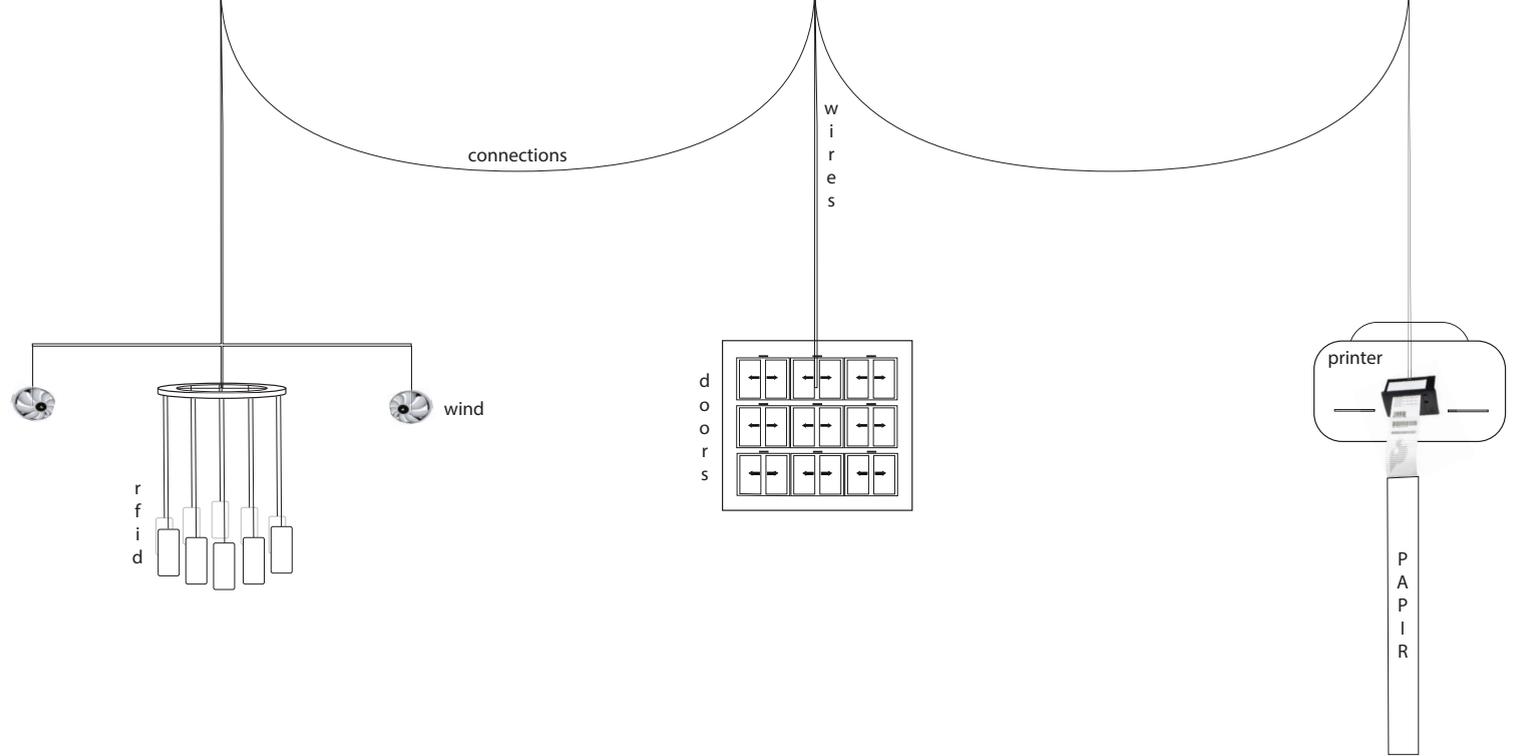
The multimedia installation *Low Pressure Calculations* was created specifically for the *Artificial Intelligence and Intercultural Dialogue* exhibition and includes a composite system of several autonomously algorithm-driven elements. The artist Dmitry Morozov, working under the alias ::vtol::, took a Wind Chime—an oriental decorative talisman that makes a ringing sound from the slightest air movement and makes the wind audible. Traditionally, the melody of wind is created by an occasional wind blow. In the installation, there is a complex system of self-learning cybernetic processes that produces sound.

The installation comprises three main elements. The first kinetic object is designed like a Wind Chime, but its traditional tubes or bells are replaced with RFID tags and a radio tag reader. RFID is an acronym for “radio-frequency identification” and refers to a technology whereby digital data encoded

in RFID tags or smart labels (defined below) are captured by a reader via radio waves (for example, in public transport tickets). There are several fans around this element that create a turbulent air flow simulating the wind. The second kinetic object consists of 12 small transparent sliding doors. They resemble the doors that are opened with RFID tags and activated when a card touches the reader in the Wind Chime. The third part is an output system. It is composed of a thermal printer (usually used for receipts) and a loudspeaker that makes sounds upon every contact of RFID tags with readers in the Wind Chime.

All the elements of the installation: wind, wind chime, automatic doors, sound, and printer—are connected in a single algorithm-driven system. Its main task is to distinguish and track sequences and repetitions in the way the wind moves the cards that control the entire system—sound and doors. As soon as the

::vtol::
 Low pressure
 calculations. 2019
 Multimedia installation
 Metal constructions,
 plastic, robotic
 mechanisms, custom-
 made electronics,
 sound system, printer
 Courtesy of the artist



algorithm recognizes some established patterns, it changes the course of the installation by manipulating the air flow. This is necessary to achieve a minimum recurrence of sounds and door movements and provide maximum variation within the entire system. Ultimately, all the results are presented on a printed statistics sheet that creates a kind of chronicle of the system.

The closed-loop system constantly experiments with random numbers, and thus it develops and evolves like a digital organism. By working with transitory and “lightweight” processes, the object creates an image of an extremely fragile and balancing system that manipulates air, emptiness, and sounds. All together this creates an infinite variation of meanings, striving to slip through constantly opening and closing doors.

::vtol:: (Dmitry Morozov, born 1986, Russia) is a Russian artist working in media and science art. He implements his ideas by technological means: robotics, video- and sound installations, science art. He supports the Aesthetics of Error and is engaged in the development and creation of experimental musical instruments and modular keyboards. He conducts master classes and lectures on technological practices in art.

He participated in CTM/Transmediale (Berlin), Ars Electronica (Linz), and the 4th Moscow International Biennale of Contemporary Art, in exhibitions at the leading world modern art venues including ZKM (Karlsruhe, Germany). He is the award winner of the Prix Cube (France), Sergei Kuryokhin Prize (Russia) and also received honorary mentions at VIDA 16.0 (Spain) and Prix Ars Electronica (Austria).

SAWTAN

DANIAH AL SALEH
(SAUDI ARABIA)

Sawtan is the Arabic word *phoneme* in English transcription. As the title is telling, artist Daniah Al Saleh deconstructed the Arabic language to the smallest linguistic unit, the phoneme. She focused on one of the most important and strong human skills — sharing ideas by means of language and researched what it is based on. Even the simplest conversation is a continuous process of encoding and decoding messages. At one level of this complex, but so familiar process, the correlation of sound and meaning takes place. Daniah literally made mathematical algorithms uncover this intuitive work that underpins communication while being something unnoticeable.

Each screen of the installation is dedicated to an individual sound. By using a special algorithm, the artist linked her recorded sound

to a geometric visual image. The machine depicted each phoneme in the form of a three-dimensional figure with sharp corners and shiny lines. In fact, the same generalization happens here: a certain sound the viewer hears is the material embodiment of a phoneme. In order to augment this connection, the algorithm makes shape change whenever Al Saleh's voice emits a sound.

The viewer faces a powerful stream of sounds characteristic of the Arabic language. However, it is impossible to figure out the meaning even if one knows Arabic. At the moment of speaking, a person does not think how his speech is constructed. The artist tries to capture the very essence with the help of machine algorithms and “parses” speech into the smallest units.

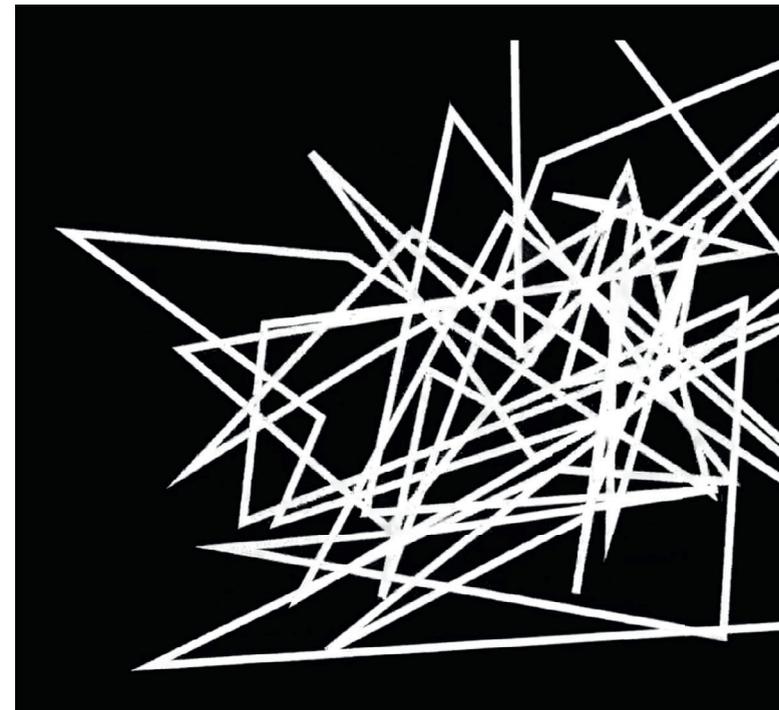
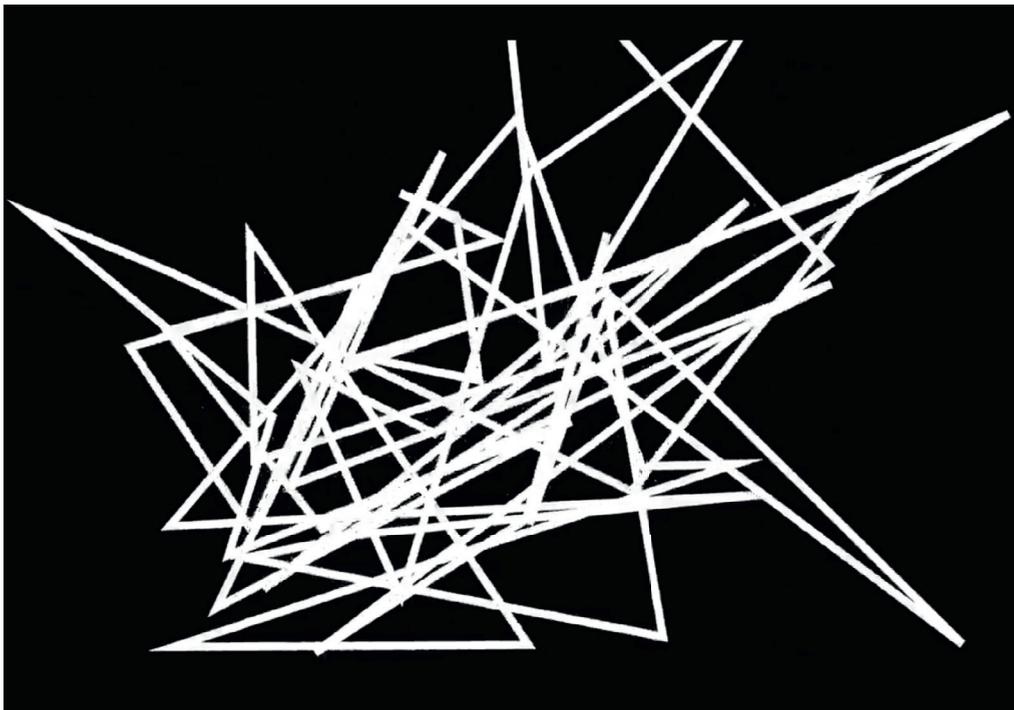
Daniah Al Saleh (born 1970, Saudi Arabia) is a media artist who works with abstract geometric symbols. She creates them with the help of computer algorithms and uses as a universal language that transforms the written word.

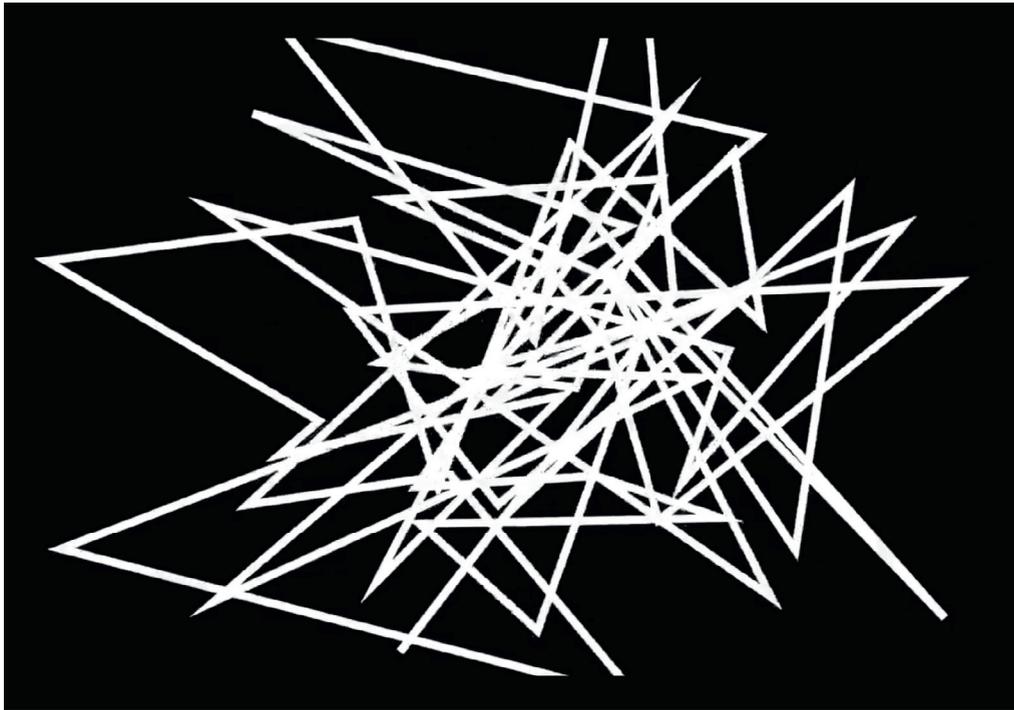
She is interested in those processes of everyday phenomena that go unnoticed due to routine. Al Saleh won the Ithra Art Prize 2019 by King Abdulaziz Center for World Culture and Art Dubai for *Sawtan*.



Daniah Al Saleh. *Sawtan*. 2018
Video installation
TV screens
Owned by King Abdulaziz Center for
World Culture (Ithra)

Daniah Al Saleh. Sawtan. 2018
Video installation
TV screens
Owned by King Abdulaziz Center for World Culture (Ithra)





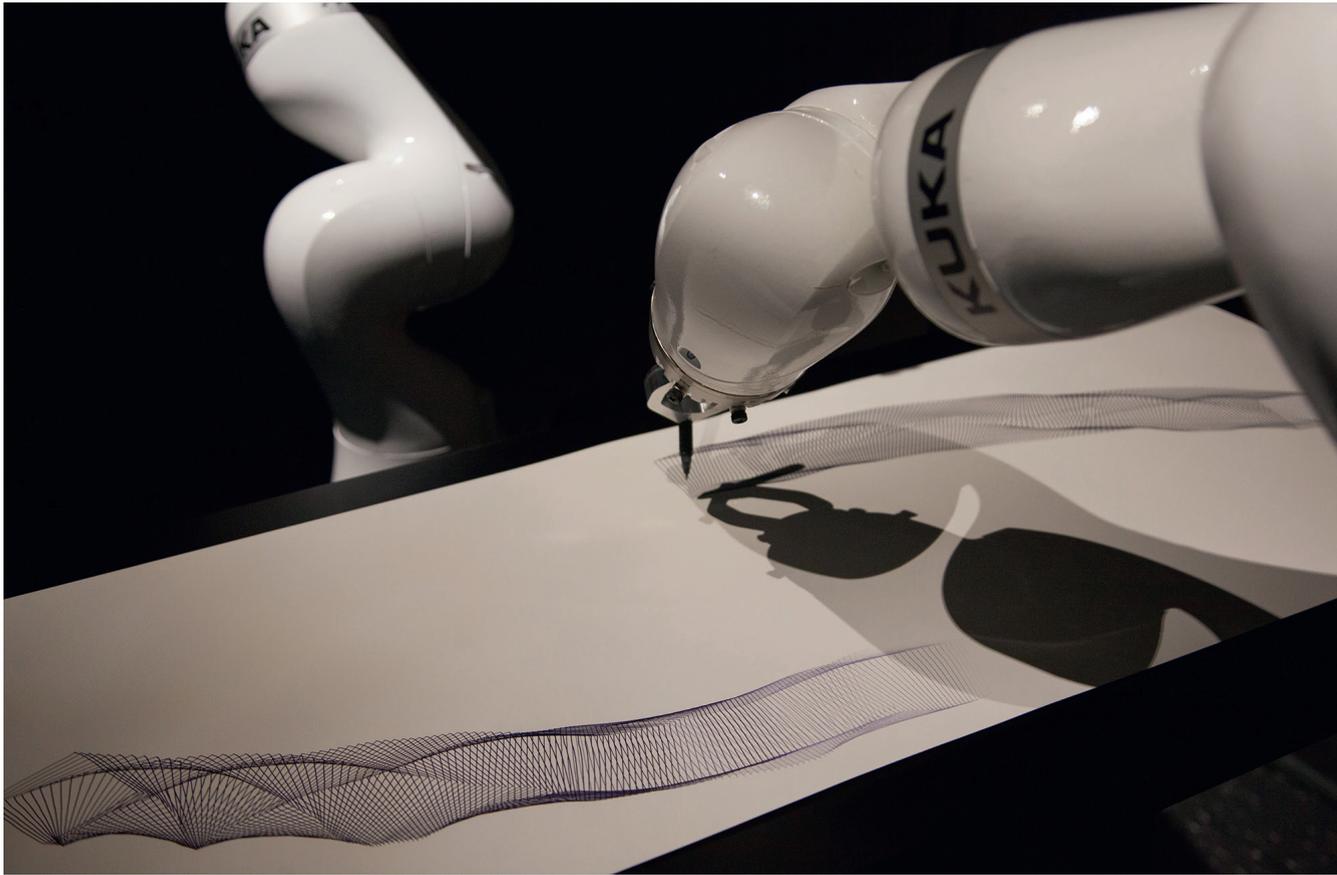
MAKING ART FOR STOCK MARKET

TEAMVOID + YOUNGKAK CHO
(SOUTH KOREA)

The art group of engineers and artists teamVOID strives to build a holistic system of technology and art and discover the esthetic in hidden processes. The installation is built on the transformation of objective economic data into a piece of art.

For the input data, the artists took the KOSPI and KOSDAQ indices of the Korean stock market. In real time, artificial intelligence analyzes the dynamics of indices but draws esthetic conclusions instead of economic ones. It correlates data with a large library of musical compositions and generates sound. Another algorithm reconstructs the data into a graphic pattern that two robotic arms put on paper. Both sound and image change when data changes, and only when they converge entirely, one can study the results of the day at the stock market. Thus, abstract economic information obtains a material and, moreover, esthetic form.

Robot manipulators are used in Korea for manufacturing automation: at factories, they serve as workers and perform routine operations. In robotic art, such mechanisms change function, since the result of their work is not a practical product but a piece of art. In this installation, AI observes the continuous dynamics of stock indices and draws an incessant abstract pattern, as if it had a deep thought. Stock exchange indices are also a kind of abstraction: they are influenced not only by purely economic processes but also by social ones. The figure that the robot draws is turned over several times and changes its size during the day — reminding how flexible a person should be in adapting to the inevitable changes.



teamVOID + Youngkak Cho. Making Art for Stock
Market. 2017
Installation
KUKA iiwa industrial robotic arm, stock market
database, paper, ink pen, speakers
Courtesy of the artists
Commissioned by Art Center Nabi

teamVOID (South Korea) is a group of media artists and programmers from Seoul. In their works, they focus on convergence of art and technology from a system point of view and attempt to understand properties of general systems, applying their various backgrounds in engineering and arts into aesthetic

explorations. teamVOID designs experimental systems and creates artworks through various media such as robotic arm, interactive media, kinetic sculpture and light art. Group's works were exhibited at Ars Electronica Festival (Linz), Electra Festival X (Montreal), numerous festivals in Korea, etc.

THE BELAMY FAMILY PORTRAITS / WONDERERS OF UKIYO

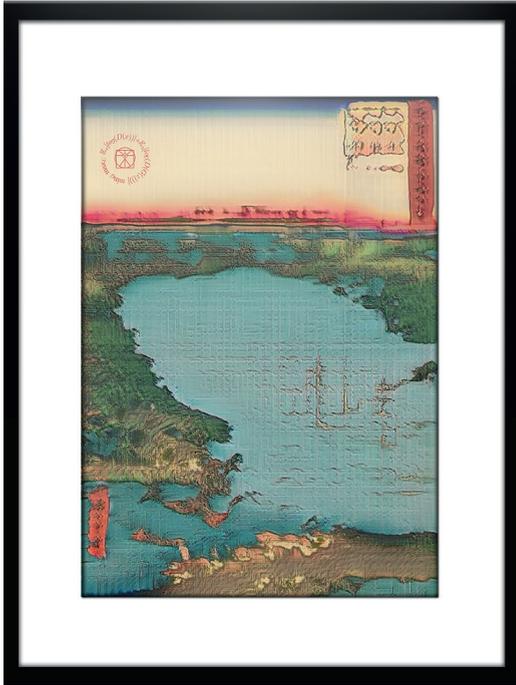
OBVIOUS ART COLLECTIVE
(FRANCE)

The exhibition holds five works by Obvious Art Collective that were created using artificial intelligence. For *The Belamy Family Portraits* series, the neural network studied portraits painted by European artists from the 14th to the 20th century, and for the landscapes *Wonderers of Ukiyo* it studied traditional Japanese prints. The portrait of Edmond de Belamy was the first ever piece produced using computer algorithms, which was sold at Christie's for incredible \$432,500.

Both series are made employing the generative-adversarial network (Bel Ami as a reference to Ian Goodfellow, the inventor of GANs). This algorithm is based on the everlasting competition between the generator and the discriminator. The generator analyzed 15,000 portraits and created new images based on this data. The discriminator constantly compares new portraits with those by the generator searching for the unlikely. Therefore, the task of the generator is to deceive the discriminator and make him think that a new image is a real portrait. As soon as it succeeds, a new work of art emerges.

The artists set a task to the algorithm to produce something new and can rest assured that such a work had never existed in a given data set. However, this does not make the machine an artist. "We are the people who decided to do this, who decided to print it on canvas, sign it as a mathematical formula, put it in a golden frame," the artists say. They seek to explore, use, and distribute various means, which machine learning algorithms can make use of to stimulate innate creative powers of a person.

Art and science have always complemented each other, and Obvious Art Collective aspire to strengthen this alliance by looking at art through machine learning algorithms, and at the same time, reconcile the old and the new. Created using AI, their works explore the boundaries of art and the role of an artist.



Obvious Art Collective
Dormant Lake
From *Wonderers
of Ukiyo* series. 2019
Print on canvas
Courtesy of the artists

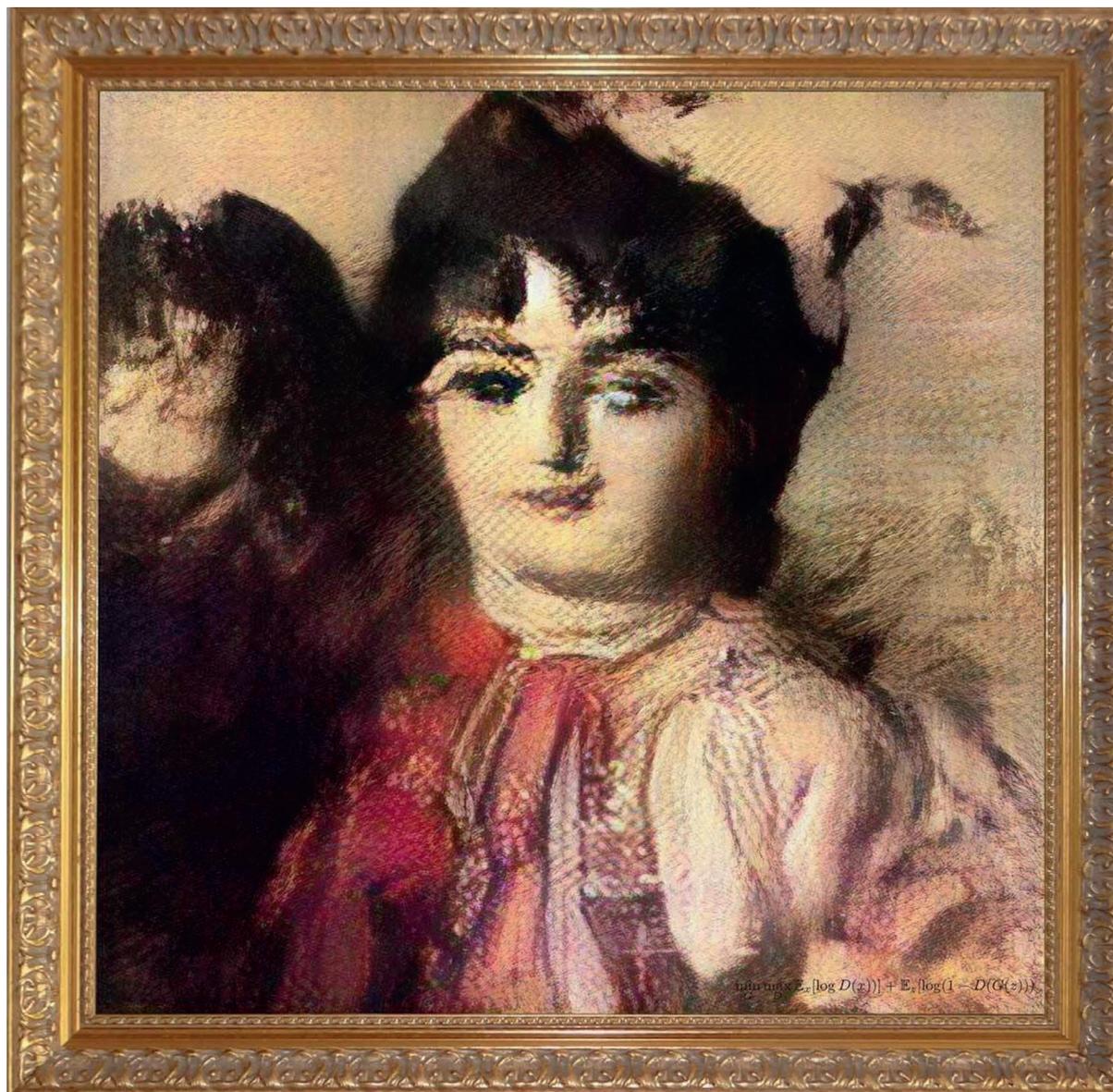


Obvious Art Collective
Saki of the Lake.
From *Wonderers
of Ukiyo* series. 2019
Print on canvas
Courtesy of the artists



Obvious Art Collective
Le Duc de Belamy
From *The Belamy
Family Portraits* series
2018
Print on canvas
Courtesy of the artists

Obvious Art Collective (France) is a French art group formed by artists and programmers sharing the common interest in artificial intelligence and machine learning. What made them famous is experiments in creating visual art by means of new technologies. The art group sees its goal in explaining and democratizing neural networks through modern art.



Obvious Art Collective
La Duchesse de Belamy
From *The Belamy Family Portraits* series. 2018
Print on canvas
Courtesy of the artists



Obvious Art Collective
L'Archeveque de Belamy
From *The Belamy Family Portraits* series. 2018
Print on canvas
Courtesy of the artists

THE PALACE

JONATHAN MONAGHAN

(USA)

Jonathan Monaghan created *The Palace* installation specifically for the exhibition in Saint Petersburg: one can easily discern the Winter Palace. The video continues the *Gotham* series, which follows a common approach of re-designing architecture by means of artificial intelligence.

In this series, the artist employs CGI (computer-generated imagery). He recreates ornate architecture in 3D modeling software while artificial intelligence interprets it in its own, dream-like way. Here, the architectural facade of the Winter Palace is simulated with the properties of fabric, elegantly waving in the

wind. Monaghan's digital animation is built on contrasts and blurs boundaries between the man-made and the natural, between the past and the future. It is both photorealistic and paradoxical. The trick that Monaghan uses belongs somewhere between video games and cinema.

Placed in a steel frame, the continuous video loop looks like a tridimensional kinetic sculpture. The viewer will see neither the beginning nor the end of the video — only the algorithm's incessant observation of the Winter Palace's architectural beauty.



Jonathan Monaghan. *The Palace*. 2019
Video installation from *Gotham* series
6-minute loop video
Courtesy of *bitforms gallery*, New York

Jonathan Monaghan (born 1986, USA) is an American video artist and animator. His works engage with various types of classical architecture and computer animation through special algorithms. Besides SGI-based animation, he works with kinetic sculptures, prints, and other items. Sourcing inspiration from ancient masterpieces, science fiction, and computer games of his childhood, he creates surreal pieces that explore wealth, power, and values in the digital age. Jonathan Monaghan's past exhibitions and screenings include The Sundance Film Festival (USA), Rotterdam International Film Festival (Rotterdam), Hirshhorn Museum (Washington), Palais de Tokyo (Paris), British Film Institute (London), Shanghai Duolun Museum of Modern Art (Shanghai), bitforms gallery (New York), and others.

MEMORIES OF PASSERSBY

MARIO KLINGEMANN
(GERMANY)

The *Memories of Passersby* installation is an infinite stream of portraits generated by artificial intelligence. In real time, a complex system of neural networks generates representations of male and female faces — sometimes surrealistic and eerie but never leaving the viewer cold. For a spectator, the experience resembles watching an act of endless imagination about human appearance, which occurs in the mind of a machine.

Mario Klingemann trained the neural network using thousands of digitized portraits from the 17th to the 19th century and trained it with his own aesthetic preferences by means of recommendation algorithms (like those dating apps use). By analyzing images, AI creates completely new works, pixel by pixel, right in front of the viewer. There is no given logic in how images come up. Sometimes pictures fall apart into an abstract set of pixels — at this point, the machine tries to create a new portrait, thus one can see how AI “thinks” in real time. The generative-adversarial network “draws” plenty of pictures, but it also filters the result of its work, showing only those pieces that it considers to be works of art. This stream never

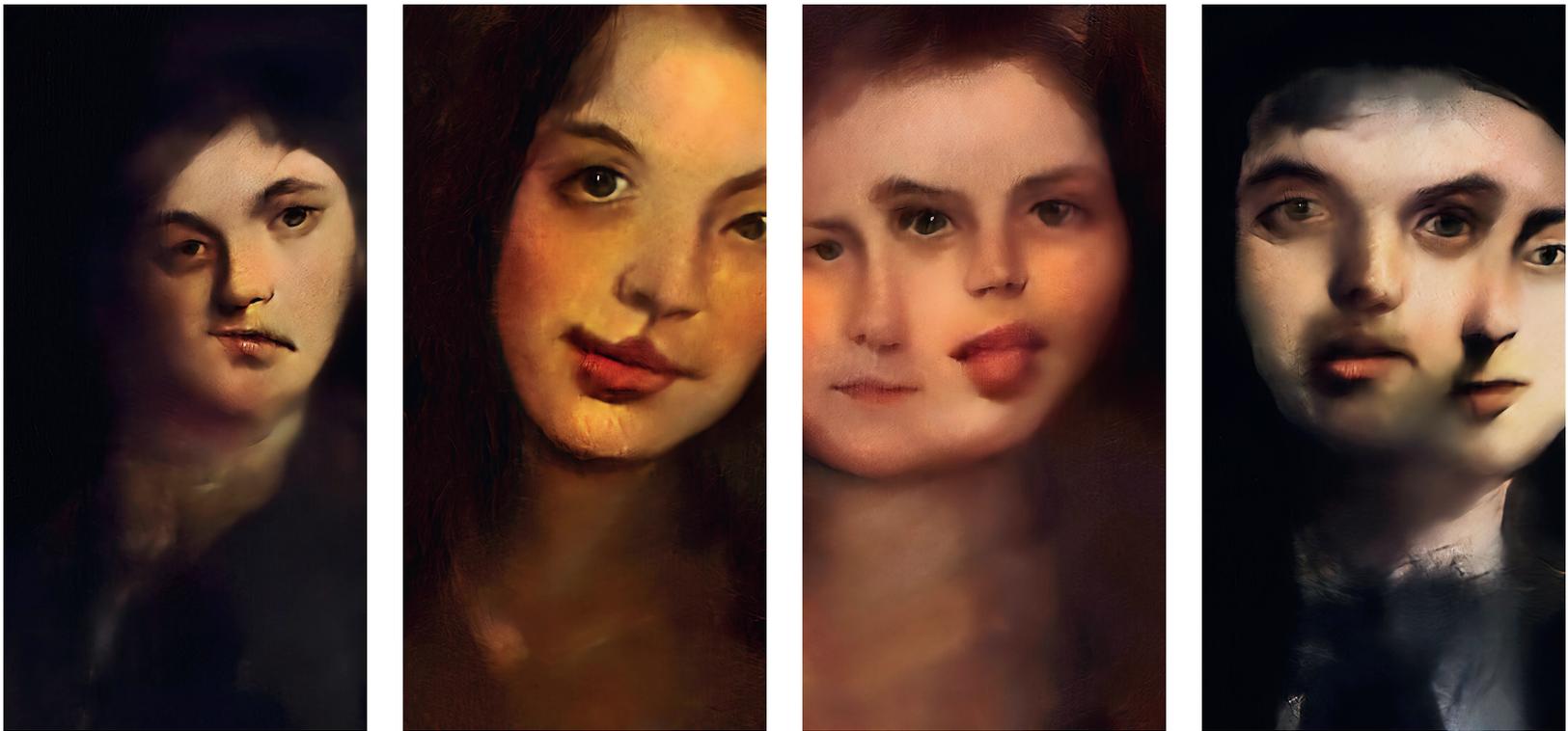
stops and will produce no repetitions until the network is working. New, unique works will replace each other — and disappear forever.

Mario Klingemann arranged a respectable set for AI that would usually be associated with classical art: the screens are put in frames, and the AI itself is placed in a special chestnut wood cabinet. Thus, the artist emphasizes that he perceives the neural network as a means for his own artistic expression, but not as a fellow artist.

The *Memories of Passersby* installation represents the new stage in the development of AI art. If neural networks used to be one of the artist’s tools, now Klingemann makes artificial intelligence the foundation of his work and sets up a completely autonomous algorithm. Moreover, no version of this algorithm repeats the “creative work” of the other, making each stream of portraits unique. This work was released in two copies. One of them was sold in March 2019 at Sotheby’s for \$52,000. The exhibition holds the second and last author’s copy.

Mario Klingemann (born 1970, Laatzen, Germany) is a world-famous artist working with neural networks, machine learning, and AI Art. He studies art, culture, and perception through the lens of AI. Mario Klingemann has worked with prestigious institutions and projects such as Ars Electronica (Linz), The British Library (London), Cardiff University, and New

York Public Library. He is a resident artist at Google Arts and Culture. His works were exhibited at MoMA in New York, at the Metropolitan Museum (New York), in Centre Georges Pompidou (Paris), Photographers's Gallery (London), etc. In 2018, Klingemann won the Lumen Prize as the best artist working with new technology.



Mario Klingemann. Memories of Passersby. 2018
Machine installation
Generative-adversarial networks, screens, chestnut
wood console
Courtesy of Onkaos gallery (Madrid, Spain)





Mario Klingemann. Memories
of Passersby. 2018
Machine installation
Generative-adversarial networks,
screens, chestnut wood console
Courtesy of Onkaos gallery (Madrid,
Spain)

DATUM

NORIMICHI HIRAKAWA
(JAPAN)

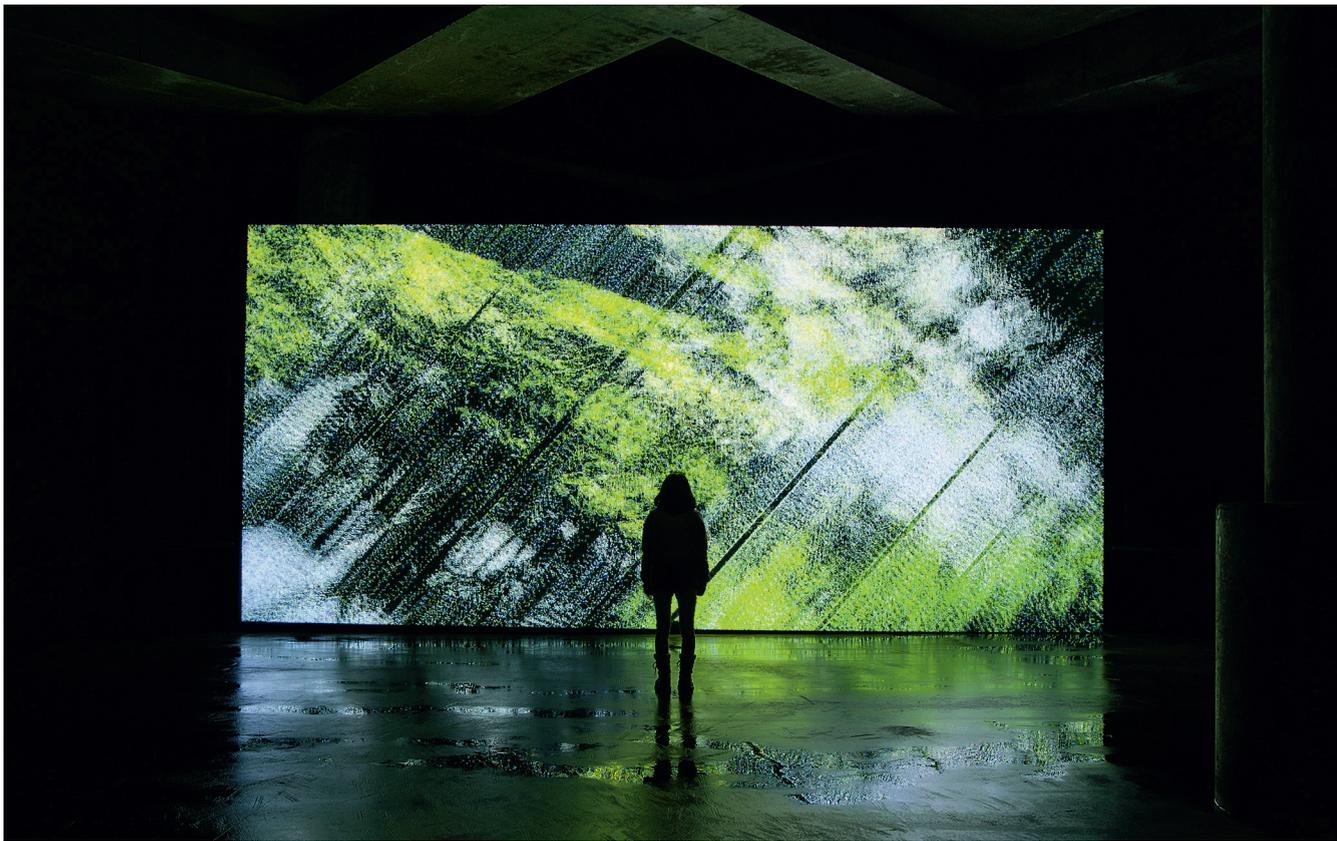
Norimichi Hirakawa started his project at the art residence in Kavli Institute for Physics and Mathematics of the Universe (Japan), during which scientists work shoulder to shoulder with artists. The artist questions the boundaries of human perception of beauty and whether artificial intelligence can enrich human imagination. Therefore, the basis of the installation is a series of experiments in a high-dimensional space.

Hirakawa provided the algorithm with a digital video file filmed at Moerenuma Park in Sapporo. Any pixel of this video can be described as a point in a six-dimensional Euclidean space with coordinates $[x, y, R, G, B, t]$. In a sequence the algorithm changes coordinate values and, as a result, the viewer sees a curve turn into gradation in color, color into motion through time, time again into a curve, and the curve into color, and so on.

The artist enters the very nature of data. He visualizes the common space so that it transforms in front of a live audience. In fact, it means we see something imperceptible by a human eye, but subject to machine intelligence. Hirakawa uses technology to challenge traditional concepts of beauty. Thus, the machine perception of beauty, which is almost boundless, challenges the human one. People are able to control the algorithms, but sometimes the visuals that machines produce go beyond what people are able to imagine.

Norimichi Hirakawa (born 1982, Japan) is one of Japan's most significant artists who works with algorithm-based audio-visual installations. His works engage both science and art, and this is why lots of prominent scientists are willing to collaborate with him. There were many exhibitions of Hirakawa's works in Japanese museums, as well as in Today'sArt.NL (Hague, Netherlands), Palace

of Arts (Cairo, Egypt), Mediacity Seoul (Seoul, South Korea), Center des Arts Enghien-les-Bains (Enghien-les-Bains, France), ELEKTRA (Montreal, Canada), and others. Also, he is a recipient of many awards including the Excellence Prize at the Japan Media Art Festival and the Award of Distinction in Interactive Art Division at Ars Electronica (Austria).



Norimichi Hirakawa
Datum. 2016
Audio-visual installation
Courtesy of the artist

Norimichi Hirakawa. Datum. 2016
Audio-visual installation
Courtesy of the artist



Norimichi Hirakawa. Datum. 2016
Audio-visual installation
Courtesy of the artist



TYPEFACE

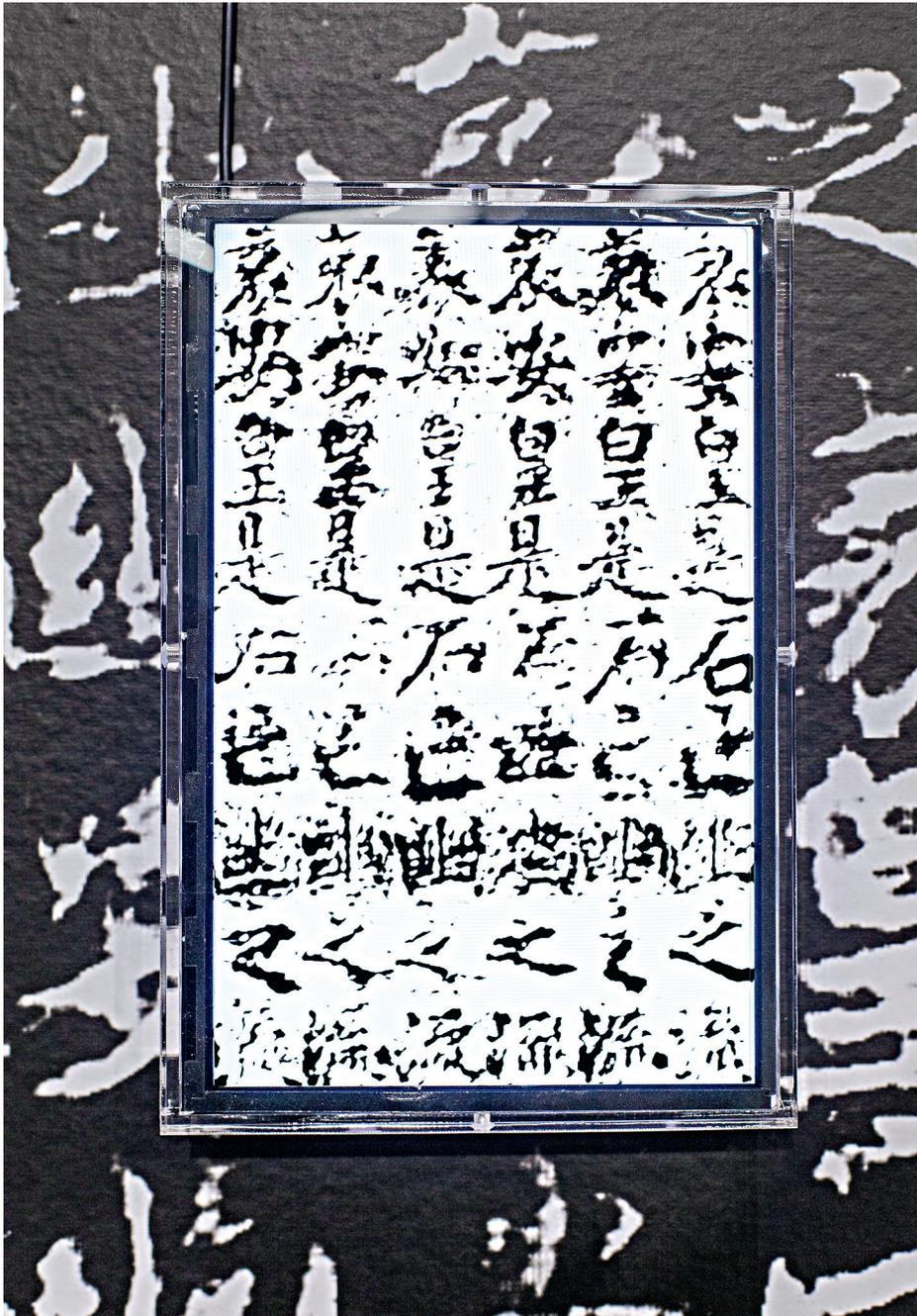
AAAJIAO
(CHINA)

The installation was an art experiment exploring ancient texts by digital means. The artist, together with a group of programmers, trained DCGAN algorithm in texts from stone rubbings. Data processing was based on repeated destruction and re-creation of meaning until the writings were reduced to pixels. And the further the neural network was trained, the more options of inscribing hieroglyphs it created. It designed new hieroglyphs, new words, and, in a sense, a new language. At the same time, the essence of the text was lost entirely; only meaningless imitation remained.

Mastering the Chinese language in a way different from human, AI soon turns to word formation. No such task was set — the machine independently acquires new abilities

characteristic of a human being. Throughout history, people composed words: recall children's neologisms, artificial languages, poetic experiments, and political newspeak. However, in most cases it is meaningless and even utopian: it is hard to make new words stay in the natural language. Thus, will speakers of the mastered language understand a text written by AI? Or maybe it is not designed for people, but is addressed to a communication system consisting of machines?

The installation unites tradition (Chinese writing) and innovation (machine learning). In real-time mode, one can observe how a neural network finds its own meaning in an ancient text and, as if imitating a person, acquires new skills based on the processed data.



AAAJIAO. Typeface. 2016
Installation
USB Installation, 10' LED Screen, Typeface File, Wallpaper
Courtesy of *bitforms gallery*, New York

Aajiao is a virtual pseudonym of a Chinese artist, programmer and blogger Xu Wenkai (born 1984, Xian, China). He creates media installations that straddle technological ideas and poetic images. Interestingly, he works with current topics and explores how Internet practices (specifically, data processing and information filtering) enter everyday life. In his installations, the artist borrows techniques from architecture, electronic music, and performative art to show how the younger generation copes with cybertechnologies and constant social media presence.

Aajiao is one of the most popular contemporary artists of China. He was exhibited at the ZKM (Karlsruhe, Germany), CAFA Art Museum (Beijing), 21st Century Minsheng Art Museum (Shanghai), The National Art Museum of China (Beijing), etc. He also received a special prize of the jury at the Art Sanya Awards (2014).

BEING AND EXISTENCE

LULWAH AL HOMOUD
(SAUDI ARABIA)

This video installation explores the relationship between language and our emotions, specifically the effect of different forms of language on the messages we communicate. Artist Lulwah Al Homoud used artificial intelligence to develop an abstract linguistic code. The algorithm evolved from Arabic ligature and, using the mathematical Vedic square that is often applied in Islamic art, recreated the alphabet in the form of a geometric pattern. This intricate symmetric web of fine lines and symbols is associated with a universal language, such a means of communication that anyone can understand.

While watching how animated patterns appear, the viewer is standing among screens and mirrors — and gradually fuses into the

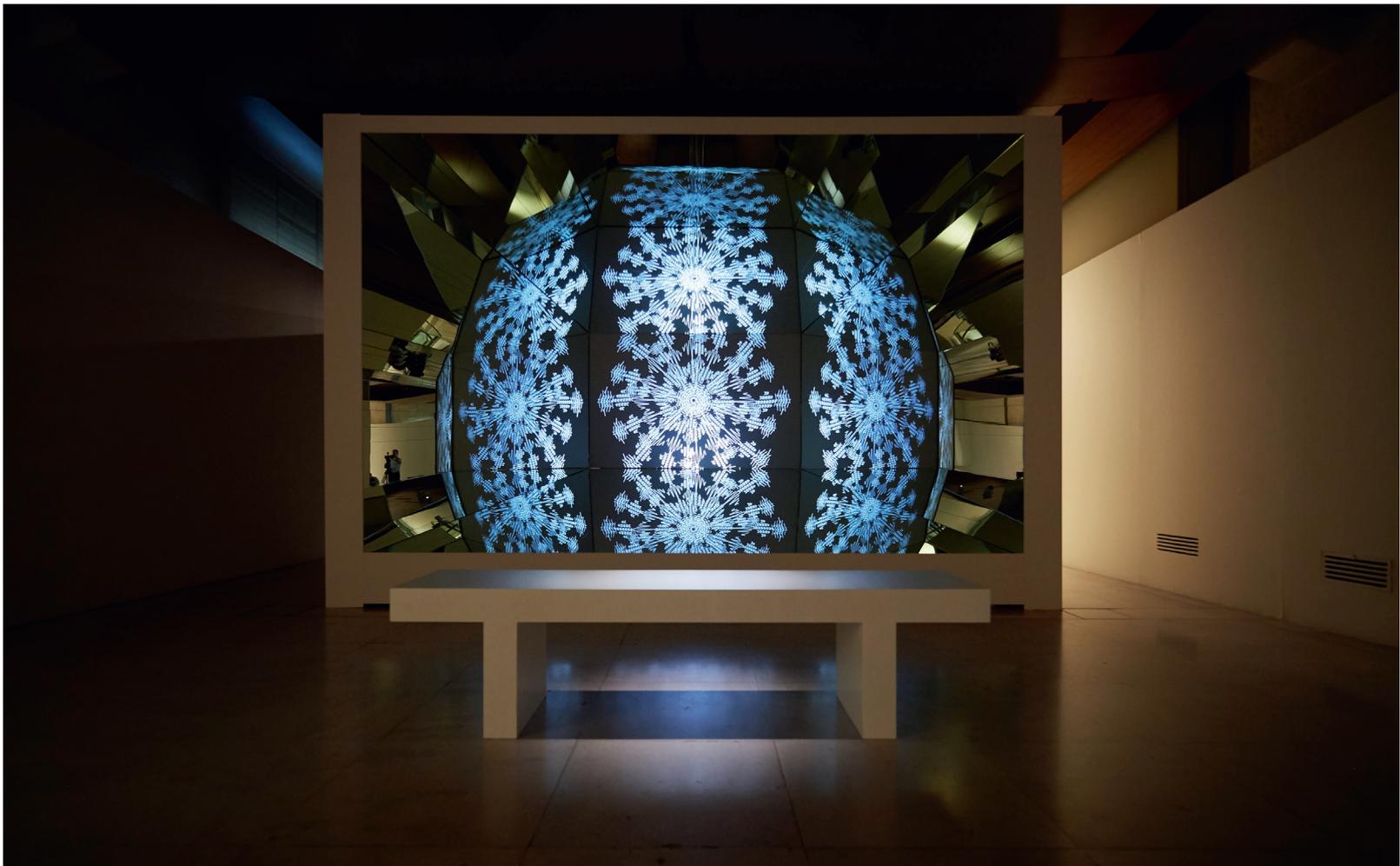
message that the machine transmits by means of this universal code. Lulwah designed the installation space that should evoke a feeling of serenity and tranquility due to the hypnotic atmosphere.

Attempts to develop a common language often become a utopia, however, a universal code can do without words sometimes — it exists at the level of symbols and abstract forms. Reflections on the form stimulate referring, by turns, to human nature and to sciences. But all these thoughts are devoted to one thing, communication. Using a “pure language,” this work merges geometry, faith, and beauty in order to “push the boundaries of what we know, how we know it and how we perceive it,” explains Al Homoud.

Lulwah Al Homoud (born 1967, Saudi Arabia) is an artist from Saudi Arabia. She received her MA from Central Saint Martins College of Art and Design (London) and then has trained with celebrated calligrapher Rasheed Butt and Egyptian calligrapher Ahmed Moustafa. As a result, the artist combines geometric patterns created by computer programs based on mathematical

formulas, traditional Arabic script, and calligraphy. Her abstract works create a new visual vocabulary in which motifs from Islamic art make rhymes from geometry and mathematics visible. The works were exhibited at the Sharjah Calligraphy Museum (Sharjah, United Arab Emirates), Sundaram Tagore Galleries (New York and Hong Kong), AB Gallery (Lucerne, Switzerland), and

others. She represented Saudi Arabia at the London Design Biennial in 2018, designed many logos including The Saudi Arabian pavilion Logo and 118 calligraphic wall panels inside The Saudi Pavilion, World Expo, Shanghai 2010. In addition, Lulwah Al Homoud worked with the British Museum on the Arab/Islamic art education project.



Lulwah Al Homoud. Being and Existence. 2019
Video installation
Owned by King Abdulaziz Center for World
Culture (Ithra)





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TIME

KOSTYA NOVOSELOV

TOGETHER WITH ZHESTKOV.STUDIO

(RUSSIA / GREAT BRITAIN / SINGAPORE)

The installation represents a perspective of the scholar-physicist Konstantin Novoselov on similarities and differences of two “intelligences,” human and artificial. Object recognition and classification is what the machine learning is built on. This technology has spread so widely that people are ready to entrust more and more important questions to it. Moreover, the complexity of problems that artificial intelligence should solve is growing. Humanity delegates risky or ethically ambiguous tasks to AI, such as driving cars or medical care.

The machine is able to analyze millions of cases and produce a result based on statistics, being devoid of emotions and fitting into the existing frame of references. But how humanly is this? What makes us human and gives humanity to intelligence: an ability to fit our desires into the existing frame of references or a skill of overcoming a system’s limitations,

creating absolutely new ideas and making bold, unexpected decisions? A human being is able to adopt both approaches, and this distinguishes human intelligence from artificial intelligence.

The installation, symbolically divided into two parts, emphasizes this difference. The video demonstrates a network learning based on real data: AI learns to recognize liquids by measuring various parameters of scattering electromagnetic waves on an object: phase and echo power, electric field amplitude. The learning process is reflected by means of color cells. Three drawings are devoted to human intelligence. They are made not only with Chinese but also graphene ink. *Time* metaphorically repeats sometimes odd classification of existing ideas and social connections, and *Mobius* and *Palmistry* predict alternative future, which is possible if out-of-the-box decisions are taken in the present.

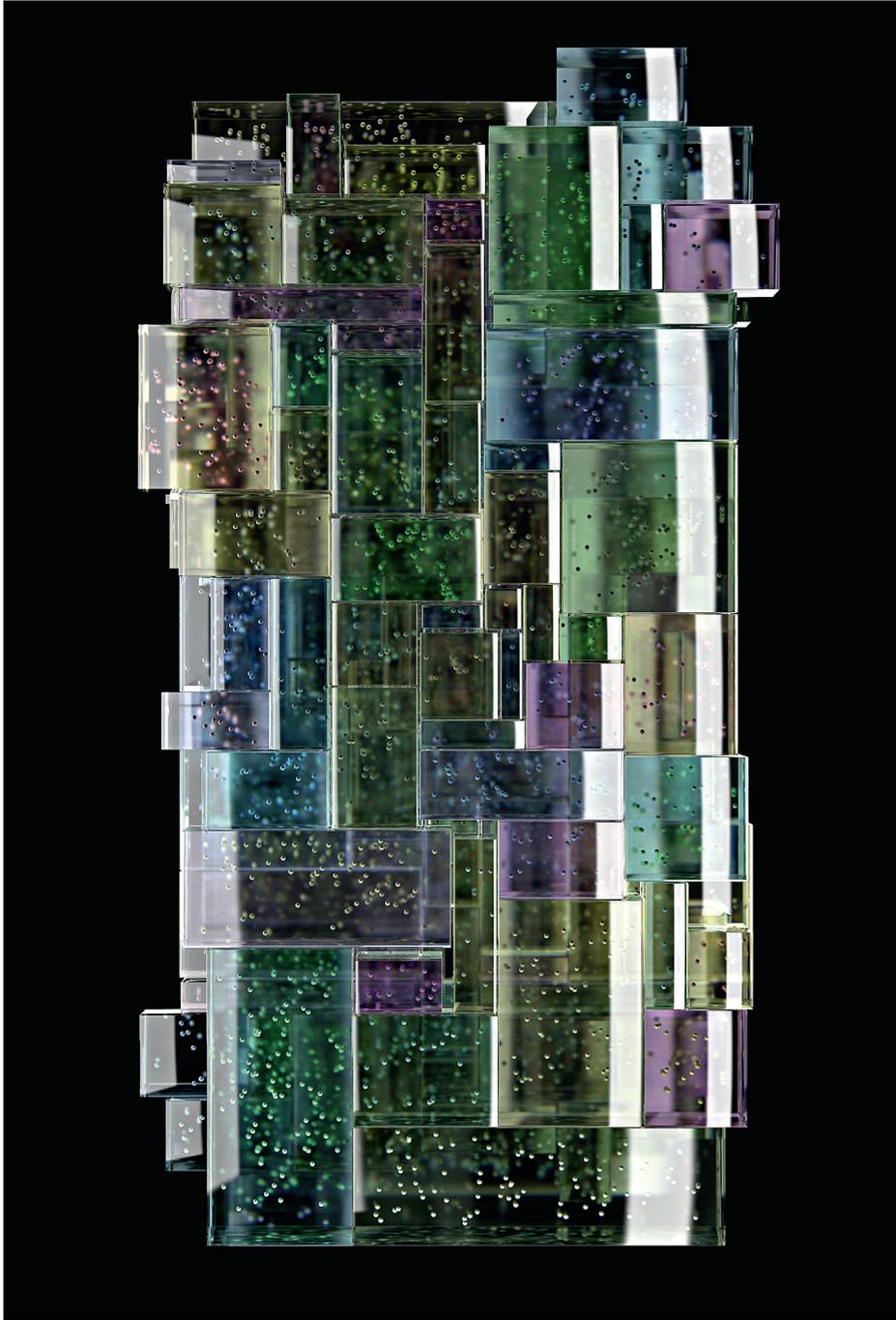
Sir Konstantin Novoselov (born 1974, Russia), Fellow of the Royal Society, is an expert in condensed matter physics, mesoscopic physics, and nanotechnology. He is best known for his work in isolating graphene at The University of Manchester in 2004, for which he was awarded the Nobel Prize in Physics (jointly with Sir Andre Geim) in 2010. Novoselov is Langworthy Professor of Physics and the Royal Society Research Professor at The University of Manchester.

Since 2014, Kostya Novoselov has been continuously listed among the most highly cited researchers in the world. He was knighted in the 2012 New Year Honours by Elizabeth II. Being a respected and established physicist, Konstantin Novoselov is also a keen artist. Having a previous education in Chinese painting, he transfers this technique to contemporary subjects and experiments with new media.



Kostya Novoselov. Together with
ZHESTKOV.STUDIO. Time. 2019
Installation
LED-screen, graphics (Chinese ink,
graphene ink, paper)
Courtesy of the artist

Maxim Zhestkov (born 1985, Russia) is a media artist and director whose practice centres around the influence of digital media on shifting the boundaries of visual language. In 2015, Zhestkov and his colleagues launched a ZHESTKOV.STUDIO that works on the intersection of art, design, computer graphics, and science. The studio develops new forms of moving images and forms for clients around the globe including Adobe, Google, Jimmy Choo, LG, Microsoft, Nike, PlayStation, Samsung, and Under Armour. Zhestkov's work pushes the boundaries of the traditional white cube gallery environment, and questions how art is and will be viewed and experienced with the increasing influence of digital media.



Kostya Novoselov. Together with
ZHESTKOV.STUDIO. Time. 2019
Installation
LED-screen, graphics (Chinese ink,
graphene ink, paper)
Courtesy of the artist

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QUAYOLA. Jardins d'Été (Summer Gardens). 2016 →
Installation
Screens, projection, video
Courtesy of *bitforms gallery*, New York