PHENOMENA

DESIGN LIFTS THE VEIL ON THE INVISIBLE TECHNOLOGIES OF EVERYDAY LIFE

NOVEMBER 29, 2018 TO
MARCH 3, 2019

MUSÉE DES ARTS DÉCORATIFS
ET DU DESIGN, BORDEAUX

MADD-BORDEAUX FR

GUIDE BOOKLET

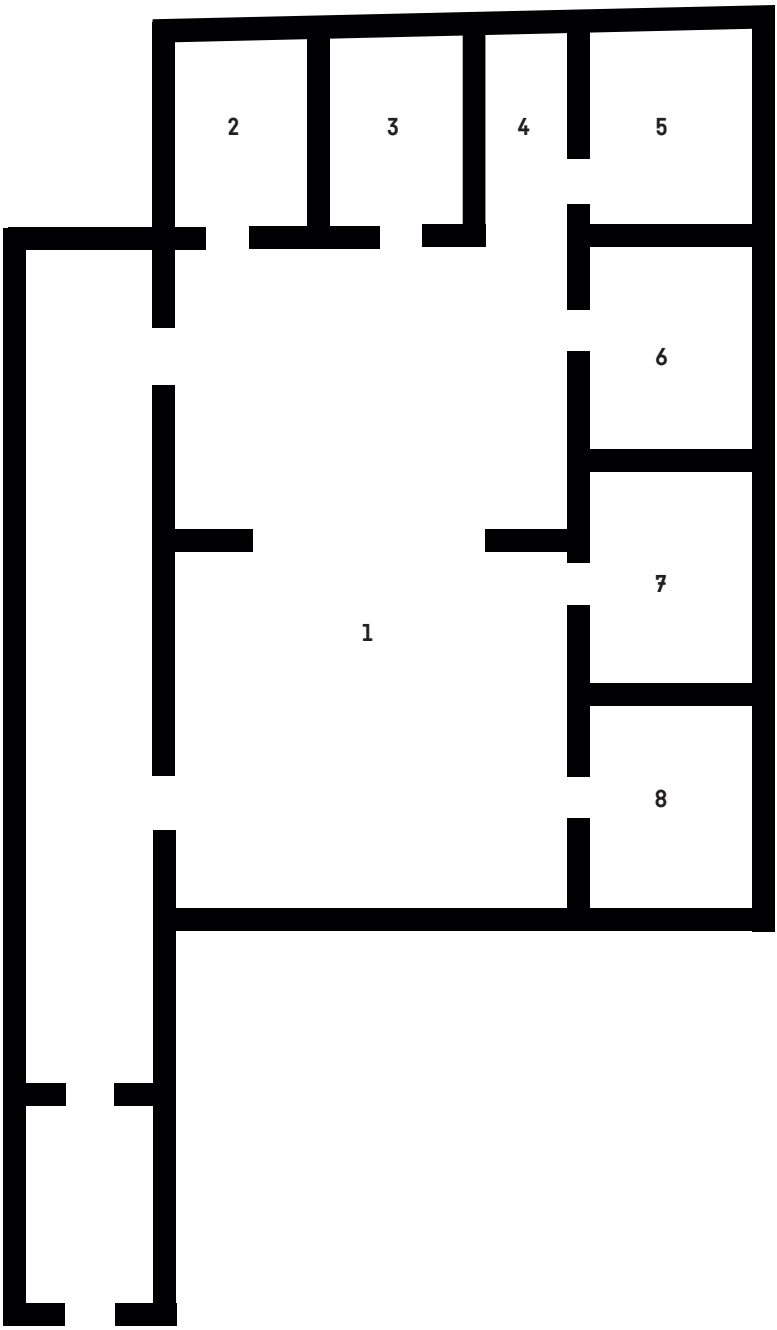
Phenomena

DESIGN LIFTS THE VEIL ON THE INVISIBLE TECHNOLOGIES OF EVERYDAY LIFE

As part of its series of invitations to young designers, the madd-bordeaux is presenting *Phenomena*, an experimental interactive project created specifically for the museum by Marion Pinaffo and Raphaël Pluvinage.

The modern world is characterized by an ever-increasing complexity that remains invisible and incomprehensible - a labyrinth of waves, sensors, motherboards, codes, algorithms, LCD screens, cell phones… For more than three years, these two designers, winners of the *2016 Audi Talents Awards*, have been exploring the laws of physics, digital technology and electronics. At the madd-bordeaux, they offer the public an opportunity to experience these scientific phenomena in a series of intuitive, entertaining, user-friendly installations.

Through these experiments, combining design, technology and pedagogy, visitors of all ages are plunged into an engaging sensory realm as they gain an understanding of these invisible complexities and feel their magic. The exhibition, presented in the former jail, makes these complex abstract phenomena tangible using simple concrete components like metal balls, cardboard and even drops of water. The result is a panoply of forms, colors and materials to be explored.


2
3
4
5
6
7
1
8

1. Code and character encoding

CODE BRICKS, 2018
MARION PINAFFO, RAPHAËL PLUVINAGE
DEVELOPED WITH THE HELP OF NINA CAPRON
PRE-CUT SCREEN-PRINTED CARDBOARD, CORK BALLS, RUBBER BAND

A code is essentially a language that can be used to transmit information to people or machines. A character code transcribes a natural language into a series of abstract characters according to a system known to both sender and receiver. It can, for example, take the form of Morse Code, which conveys messages in dots and dashes, or the binary system (1 or 0) that serves as the basis of all digital technology.

Code Bricks is a cardboard construction that combines elements of various encoding systems in a character code using colors.
The series of colors form sequences of instructions. You are invited to line up colored cardboard blocks following a specified order of colors.
Once the sequence is completed, you will discover the circuit that was contained in the code. By releasing a ball into the circuit, you can observe its pattern and follow the sequencing of the modules.
The designers have encoded 15 circuits. You can also create your own circuit and save it as a color code for other players.

INSTRUCTIONS

1 TAKE A SHEET SHOWING THE COLOR SEQUENCES.

2 CHOOSE ONE OF THE SEQUENCES.

3 PLACE THE BLACK BLOCK ON THE FLOOR. THIS IS THE END POINT.

4 NEXT TO THE BLACK BLOCK, PLACE THE BLOCK THAT CORRESPONDS TO THE NEXT COLOR. USE AS MANY BROWN BLOCKS AS NEEDED TO ADJUST THE HEIGHTS.

5 CONTINUE IN THIS WAY UNTIL YOU HAVE COMPLETED THE ENTIRE CODE.

6 RELEASE A BALL AT THE STARTING POINT TO VERIFY THE PROPER COMPLETION OF THE CIRCUIT. ADJUST THE DISTANCES IF NECESSARY.

7 INVENT YOUR OWN CIRCUIT AND RECORD IT AS A COLOR CODE USING THE MARKERS.

Smoke signals

A smoke signal uses the smoke of a fire to send a simple message over long distances. This form of optical communication requires that the transmitting and receiving parties agree beforehand on the meaning of the smoke patterns. Controlling the size, shape and pace of a smoke signal requires a degree of expertise.

Sign language

Sign language is a visual language that deaf and/or mute people use to communicate. It comprises a set of gestures and signs that signify a word, an expression or the letters of a word. The signs are formed by configurations of the arms, hands and fingers. There are several sign language systems in use in different countries and regions of the world. It was not until the 1960s that sign language was considered a separate language unto itself, as a result of research on the structure of American sign language by the linguist William Stokoe. Only a few of the 100 or so sign languages in the world have been accorded legal recognition – most have no official status.

The Navajo code

The Navajo tribe of Native Americans has a language so different from all other languages that it was used by American intelligence services during World War II. The military recruited Navajos, who would translate top-security messages into their native tongue before encryption. Since the language did not have equivalents for all of the necessary military terms, other Navajo words were used as substitutes. For example, *da-he-tih-hi*, the word for "hummingbird," was used to designate a fighter plane.
This technique prevented Japanese agents from breaking the American code. After the war, the head of Japanese intelligence admitted that they had succeeded in deciphering the code used by the U.S. Air Force, but they were never able to decode the Navajo. In the interest of American national defense, the work of the 400 Navajo "code talkers" remained classified information until 1968.

The Chappe telegraph

At the end of the 18th century in France, a priest named Claude Chappe (1763-1805) and his brothers designed what is now recognized as the world's first telecommunication network. Developed during the French Revolution, it was used to transmit messages (telegrams) in the form of optical signals along a series of relay towers. Called semaphores, they were built on high ground to make each one visible by telescope to the next towers in the chain. Semaphore

networks were built to create communication lines all across France.
Each tower was topped with a set of movable arms, manipulated manually. The arms could form various configurations to indicate the numbers between 1 and 92. These referred to a dictionary of prepared phrases: the first number designated the page and the second number the line on that page. Each signal was observed by the neighboring tower, which reproduced it for the next tower down the line, and so on. Once decoded, the dispatches were delivered on foot or on horseback to their intended recipient. In this way, a message could be sent from Paris to Strasbourg in just two hours.

Morse code

Developed in 1838 by the American inventor Samuel F. B. Morse, Morse Code is used to transmit texts. This international communication system translates the letters of the alphabet and the digits 1 through 9 into a series of dots and dashes, conveyed in the form of short and long audio or visual signals.
It has been used primarily by the military as a messaging method, as well as in aviation and maritime transport.

Punch cards

In Lyon in 1725, a textile worker named Basile Bouchon invented what is now considered the world's first programming system: a perforated ribbon that delivered instructions to a loom. The ribbon was later replaced by a series of perforated cards connected in sequence, which became the basis of the Jacquard weaving system, named after its inventor, Joseph Marie Jacquard.
It was the 19th-century mathematician Charles Babbage who came up with the idea of using perforated cards to control what he called an "Analytical Engine," a machine for calculating and printing mathematical tables. The concept was further developed by companies like IBM and Bull, and punch card machines were used to facilitate, for example, the American census of 1890. In 1928, IBM launched its famous 80-column punch card, which remained the universal medium for computer data and programs for the next 50 years. The system gradually fell out of use starting in the 1980s.

Bibi-binaire code

"In French slang, bibi means me, my name is Bobi and children call me Bibi. So just to flatter myself I call this system bibi."
Since the base-2 numeral system is called binary, the singer and humorist Boby Lapointe proposed "bi-binaire" for base 4 and "bibi-binaire" for base 16, or hexadecimal. In 1968 he patented a hexadecimal system with pictograms, accompanied by an amusing phonetic conversion method for speaking in "hexadecimal language."
Using four consonants and four vowels, he proposed replacing the 16 digits with 16 letter combinations: HO (0), HA (1), HE (2), HI (3), BO (4), BA (5), BE (6),

BI (7), KO (8), KA (9), KE (10), KI (11), DO (12), DA (13), DE (14), DI (15). To say a number, a hexadecimal speaker simply pronounces the syllables representing its digits from left to right. The use of bibi-binaire becomes complicated, if not incomprehensible, for numbers of more than three or four digits.

The Jefferson cylinder

This cylinder was invented in the late 18th century by the future president of the United States, Thomas Jefferson, as a means of encrypting and decrypting messages. It consists of 26 wheels mounted on a spindle around which they can rotate independently. The edge of each wheel is inscribed with the 26 letters of the alphabet in different orders, separated by marks to make them easy to align. The message is formed by turning the wheels and encrypted by sending to the receiver the line above or below the actual message. The receiver must have a cylinder identical to the sender's in order to decode the message.

The Assyrian cipher or Spartan scytale

First mentioned in the 6th century BCE, this technique consists of writing a message on a strip of leather, parchment or paper rolled around a cylinder, also known as a *scytale* or "Plutarch's staff." Once unrolled, the strip is illegible and can only be decrypted by coiling it around a cylinder of the same diameter. The technique is mentioned in a military context, to prevent messages from falling into enemy hands. The messenger assigned to deliver the strip would wear it like a belt, with the inscription turned inward, for further concealment.

2. Functionalized surfaces

WATER TOWER, 2017
JULIETTE GELLI, RAPHAËL PLUVINAGE
RESIDENCY AT THE CHARLES SADRON INSTITUTE, CNRS
SCIENTIFIC MANAGER: WIEBKE DRENCKHAN
MOLDED PLASTER, SUPERHYDROPHOBIC POLYMER, EYEDROPPER, COLORED WATER

The term “functionalized surface” is used to designate a set of materials whose surfaces exhibit exceptional behaviors due to their invisible structures and textures. For example, a superhydrophobic surface, like that of a lotus leaf, is very difficult to wet. Water flows rapidly over it, never soaking into the material. This phenomenon is the result of a complex structure on a microscopic scale, invisible to the naked eye.

Water Tower is a set of circuits for water droplets. The plaster slabs are covered with a superhydrophobic polymer that repels water drops. Various types of blocks (straight channels, turns, loops…) make it possible to play with and gain an understanding of this invisible physical phenomenon.

INSTRUCTIONS

1 USE THE BLOCKS TO CREATE A CHANNEL.

2 HANDLE THE BLOCKS WITH CARE. THE SUPERHYDROPHOBIC SURFACE IS FRAGILE – DO NOT TOUCH IT WITH YOUR HANDS.

3 PLACE A BOWL OR ABSORBENT DISK AT THE END OF THE CIRCUIT.

4 WHEN YOUR CIRCUIT IS COMPLETED, USE THE EYEDROPPER TO RELEASE A SINGLE DROP OF COLORED WATER AT THE TOP OF YOUR CHANNEL.

5 OBSERVE, ADJUST AND MODIFY THE CIRCUIT TO OPTIMIZE THE WATER’S PATH.

6 WHEN YOU ARE FINISHED, EMPTY THE BOWL OF COLORED WATER INTO THE CONTAINER ON THE RIGHT.

Superhydrophobia

Unlike hydrophobia, which is a chemical property, superhydrophobia is a physical characteristic. It is found in nature: lotus leaves and duck feathers have superhydrophobic surfaces. Seen under a microscope, these surfaces reveal their secret: a structure comprising millions of cones that create a contact angle greater than 150°, which prevents any water from penetrating.

The lotus effect

Its name comes from the aquatic plant, whose leaves have a rough surface on a microscopic scale, making them not only superhydrophobic but also self-cleaning. As water streams over the leaves, it washes away any dust or other foreign matter. The effects of this phenomenon have been known in Asia for thousands of years. In the 1970s, the botanist Wilhelm Barthlott began studying the lotus and the nature of its surface using electron microscopy. His research made it possible to identify the phenomenon and apply it biomimetically to technical materials.

Surface functionalization

The term surface functionalization designates the addition of properties to the surface of a material in order to improve its qualities or give it new functions, like adhesion, impermeability, electrical conductivity or thermal resistance. This can be accomplished in different ways, such as coating the material or changing its molecular structure by grafting molecules with specific properties. The purpose is to optimize the material and make it as compatible as possible with its future environment and application.

3. Touchscreens and pushbuttons

NOISY JELLY, 2013
MARIANNE CAUVARD, RAPHAËL PLUVINAGE
SOUND AND PROGRAMMATION: LÉO BAQUÉ
JELLY, GAME BOARD, ELECTRONIC SYSTEM, LOUDSPEAKER

Our use of pushbuttons has evolved considerably in recent years since the invention of the touchscreen. In a cell phone, for example, this "capacitive" technology is based on a conductive grid covered by a sheet of glass. The human body, made up largely of water, is also conductive. A fingertip held over the grid attracts its charge, modifying the electrical field at the point of pressure and generating a signal.

Noisy Jelly is a proposal for expanding our scope of imagination in relation to the physicality of the pushbutton. Wet, soft and sticky, *Noisy Jelly* is a sonic "chemistry set" offering an experience that's the opposite of using a smartphone. Blocks of colored gelatin, resting on metal contact points linked to an electrical current, produce various sounds when they are touched. The jelly consists almost entirely of water and is thus conductive. The sound is different depending on where the jelly is touched: as you go farther from the base, the signal becomes weaker and the sound changes. The use of a soft, perishable material as a control tool offers an intriguing, disconcerting experience.

INSTRUCTIONS

1 IMPORTANT: THE JELLY BLOCKS ARE FRAGILE. TOUCH THEM GENTLY!

2 TOUCH ONE OF THE JELLY BLOCKS WITH A FINGERTIP AND LISTEN.

3 NOW TOUCH THE SAME BLOCK BUT IN A DIFFERENT PLACE: NOTICE THE DIFFERENCE IN THE SOUND!

4 DO NOT MOVE THE JELLY BLOCKS. THEY MUST BE TOUCHING THE METAL CONTACTS IN ORDER TO PRODUCE SOUND.

Switch

A switch is used to turn an electrical device on and off. It takes the form of an actuator that opens and closes the circuit that powers the device. By extension, any mechanism that switches something between two states can be called a switch.

Capacitive switch

A capacitive switch does not have to be pressed – it is activated simply by touching it. A capacitor, an electronic component with an electrical charge, is placed under the switch and discharges when it is touched. It can be activated by any mass of conductive material. The human body, consisting mainly of water, is conductive, and any conductive object (a metal wire, a piece of fruit) can be placed between the human body and the capacitive switch to activate it.

Capacitive screen

A touchscreen that uses capacitive technology consists of a solid surface, usually made of glass, covering and concealing an electrically charged grid. By touching the surface, the user accesses the charge, and sensors at the four corners of the screen calculate the finger's position based on the electrical outflow. This technology is called capacitive because the touch of a finger locally modifies the electronic capacitance. The contact of one or more fingers on the screen creates an electrical disturbance that is localized by the grid, which can also detect the direction of movement and in some cases the degree of pressure, in order to translate that data into operational instructions.

4. Electronic components and sensors

ARCADE POSTER, TARGET N°2, 2017-2018
MARION PINAFFO, RAPAHËL PLUVINAGE
SOUND: FLAVIEN BERGER
POSTER, SCREEN PRINTED IN FOUR COLORS INCLUDING ONE CARBON INK, ELECTRONIC SYSTEM, LOUDSPEAKER, STRAWS, WET PAPER

All of the sensors that surround us, whether they detect light, water, the temperature or wind, are based on the principle of the switch: a physical system or chemical component that allows more or less electrical current to pass depending on the environmental measurement in question. For example, the humidity sensors in our electronic devices incorporate a water-absorbent material, usually paper. Depending on the quantity of moisture absorbed, the material conducts more or less electricity.

This *Target* functions as a gigantic humidity sensor. Using a straw like a blowgun, players propel balls of wet paper onto the poster. When one of them touches two lines of black conductive ink, it closes the circuit and triggers the playback of a sound. Each of the target's zones, some easier and some harder to hit, produces a specific sound. If you hit them fast enough, the sounds overlap and create a musical composition.

CAREFUL. NOT SUITABLE FOR CHILDREN UNDER 36 MONTHS

INSTRUCTIONS

1 TAKE A PIECE OF PAPER, CRUMPLE IT UP TIGHTLY AND SOAK IT IN WATER TO MAKE A WET BALL.

2 TAKE A STRAW AND INSERT THE PAPER BALL IN ONE END.

3 BLOW THE BALL ONTO THE TARGET, AIMING FOR A ZONE COVERED IN CONDUCTIVE INK, AND LISTEN.

4 WHEN YOU HAVE FINISHED, THROW AWAY YOUR STRAW, WHICH WILL BE COMPOSTED.

5. Electronic components and sensors

PAPIER MACHINE, VOLUME 0, 2017-2018
MARION PINAFFO, RAPHAËL PLUVINAGE
PROGRAMMATION: ROMAIN COCHET
INSTRUCTION MANUAL BY FLORA LANGLOIS
PUBLISHED BY PANOPLIE
49 PAGE BOOK, DIRECT COLOR OFFSET, SCREEN PRINTED SILVER INK, BATTERIES, ELECTRONIC COMPONENTS

We use electronic objects every day, but still their inner workings can seem mysterious. On our telephone screens, the automatic rotation from portrait to landscape display appears to be inexplicable, nearly magical, but it is simply the result of a gyroscope integrated into the device. There are also internal sensors that allow the phone to indicate if it has become wet, if it is being shaken, if it is held next to an ear, if it is nighttime, etc. These components seem to have invisible, intangible, incomprehensible qualities. But a closer look reveals their secrets.

Papier Machine n°0 is the first in a collection of books for exploring the hidden mechanisms of the world of electronics. This inaugural issue contains six electronic toys in pre-cut paper, screen printed with an ink that conducts electricity. All of the games produce sound and each one illustrates a different physical principle used by sensors. They reveal the realm of materials, shapes, colors and stories that lies behind the magic of our devices.

The piano illustrates the functioning of resistance through the conductive properties of the carbon contained in a pencil lead. Depending on the thickness of the pencil marks on the piano keys, higher or lower notes are emitted when it is played. The marks can be erased to start over.

The marble slide and the disk also illustrate the principle of resistance, playing on the conductive properties of metal and graphite. The marble is moved by gravity or centrifugal force. Each time it crosses a zone covered with graphite, it closes the circuit and a sound is produced. These two games are like musical scores to be “played” by the marble.

The ghost illustrates the principle of a wind sensor. When exposed to wind, or a person blowing or shaking them, the strands of silver-coated fringe touch, closing a circuit. Depending on the strength of the wind (or breath) and its direction, the contacts change, thus changing the sound.

The S-shaped track illustrates the principle of the gyroscope through the conductive properties of metal. Placed in the slot, the marble connects each

side of the circuit. When the sheet is tipped to roll the marble toward the battery, the sound grows louder. The half-circle rocker illustrates the principle of a rocker switch. The marble is placed in a track inside the rocker. Different-shaped blocks are stacked on top. When the rocker tips, the marble rolls toward one of the two silver-coated ends. When it touches one, it triggers a sound.

THREE OF THE SIX GAMES FROM *PAPIER MACHINE* ARE AVAILABLE FOR YOU TO TRY. HANDLE THEM WITH CARE!

1 THE PIANO: IMPROVISE A MELODY BY PRESSING THE KEYS. THE PENCIL MARKS CONDUCT MORE OR LESS ELECTRICITY DEPENDING ON THEIR DENSITY, RESULTING IN HIGHER OR LOWER NOTES.

2 THE SLIDE: RELEASE ONE OR TWO MARBLES AT THE TOP OF THE CHANNEL AND LISTEN TO THE MELODY THEY PRODUCE AS THEY SLIDE DOWN.

3 THE GHOST: BLOW ON THE PAPER FRINGE AND “PLAY” THE RESULTING SOUNDS LIKE BLOWING A HARMONICA.

Electrical conductivity

This term is used to characterize the capacity of a material or a solution to convey an electrical current. Due to their high concentration of free electrons, metals like copper, silver, gold and aluminum are very good conductors of electricity. The human body, being made up largely of water, is conductive. Certain fluid solutions contain mobile ions in the form of electrolytes, which, depending on their nature and concentration, are also electrically conductive.

Electricity

Since ancient times, people have been aware of the existence of electrical charges in their environment, for example by observing that rubbing two materials together can produce an imbalance of electrical charge. Studies conducted on the properties of electricity gradually led to the harnessing of this type of energy in the 19th century. Since the dawn of the industrial age, electricity has mainly been used as a power source, but also to transmit information, from the telegraph to modern-day digital networks.

Electronics

Electronics is a branch of applied physics that involves the study and use of electrical energy to detect, transmit and utilize information, both tangible (temperature, sound, speed…) and abstract (images, texts, etc.). Applications of electricity for this purpose have developed exponentially since the beginning of the 20th century. Improved methods and the miniaturization of components have led to the multiplication of electronic devices, from the transistor to the smartphone.

Short circuit

This phenomenon is the result of a direct contact between two conductors of an electrical circuit that should normally be separated, one being for the incoming and the other for the outgoing current. When this happens, the current takes a “shortcut” – hence the term short circuit. The result is an increase in the intensity of the current and the temperature of the conductors, possibly breaking the current. Most short circuits are caused by faulty wiring or inadequate insulation.

6. Display

LIQUID SCREEN, 2018
MARION PINAFFO, RAPHAËL PLUVINAGE
IN COLLABORATION WITH SMIIRL
SOFT PIPES, WOOD STRUCTURE, COLORED WATER, PUMPS, ELECTRONIC SYSTEM

In the city we see screens everywhere, all day long. These displays tend to become standardized: screens have replaced store signs, split-flap departure boards in train stations, trivision billboards and other ads. The resolution of the screens has been improved to the point that their pixels are no longer visible to the naked eye.

Liquid Screen takes the opposite approach from these perfect images. In the form of a scrolling screen made up of droplets circulating in a pipe, it transmits information while revealing its mode of functioning

The pixel

The pixel is the smallest element of a digital image or screen. It is also the unit used to measure the definition of a digital image. Each pixel has its corresponding color, broken down into three primary components, red, green and blue. The higher the number of pixels, the better the image quality. An image's resolution is expressed in a number of pixels per unit of measurement.

Liquid crystals

Liquid crystals can be found everywhere in nature. Capable of reflecting light, they are used, for example, on banknotes to create zones whose color varies depending on the angle of observation.
A liquid crystal screen uses the capacity of liquid crystals in a "nematic state" (between the solid and liquid phases) to react to light, in different ways depending on their orientation, and to an electrical current. In a screen, liquid crystals are placed in the middle of various other layers including a mirror and two polarizing filters. Originally used for calculators and watches with monochromatic displays, liquid crystal screens are now used for televisions and computers.

7. Storage

100 METER STORIES, 2018
TAMARA EFRAT, MARION PINAFFO, RAPHAËL PLUVINAGE
ELECTRONIC SYSTEM BY EYEOH
CREATED FOR JERUSALEM DESIGN WEEK 2018
REEL OF COTTON RIBBON, METAL FRAME, MOTOR AND ELECTRONIC SYSTEM

Today we have the capacity to store unlimited amounts of information, with no restrictions in terms of quantity or storage space. Does this apparent absence of limitations have an effect on the quality of the content?

100 Meter Stories is a display screen made up of a moving ribbon mounted on a metal frame. This device re-examines the equation between the sophistication of the message and the restrictions of its display system. As the ribbon moves, it displays an encrypted message. At certain moments the patterns converge to reveal intelligible shapes, which then disintegrate to create new ones.

Unlike a USB flash drive, this storage device makes its content visible. There is a direct and obvious link between storage and display. There are six reels corresponding to six different stories. The reel shown here is an interpretation of the story of the Big Bang, the cosmological model used by scientists to describe the origin and expansion of the universe.

Magnetic tape

Offering extensive storage capacity, magnetic tape can be used to record and retrieve analog or digital information. First developed in Germany in 1928 by Fritz Pfleumer, it has taken the form since the 1940s of a plastic tape coated with a thin layer of a material sensitive to magnetic fields upon which binary data can be transcribed, with non-magnetized zones representing 0 and magnetized zones representing 1. Originally stored on reels and later cassettes of various types, magnetic tape was improved over the years, greatly increasing its storage capacity. However, the time needed to wind the tape to the desired spot is too long for many applications, which is why this type of storage is mostly limited to backups and archiving.

The vinyl disk

It was the most widely used medium for the reproduction of sound recordings in the second half of the 20th century. The vinyl disk, also called a phonograph or microgroove record, is a disk made primarily of polyvinyl chloride (PVC). On a master disk made of aluminum and coated with a nitrocellulose varnish, a spiral groove is engraved using a sapphire or diamond cutting stylus. This master is used to press vinyl copies. The stylus of the record player, equipped with a sapphire or diamond tip, is placed on the groove. As the disk turns, the stylus transmits the physical deviations of the groove to an electromagnetic device that transforms these vibrations into an electrical signal.

CD-ROM

Developed independently by Philips and Sony in the late 1970s, this type of disk was conceived as a medium for storing and retrieving digital data. A CD-ROM (the name is an abbreviation of Compact Disc Read-Only Memory) is a plastic disk about 12 cm in diameter with a hole in the middle. Binary data is recorded on it by engraving a spiral track of alternating “pits” and “lands” (indentations and the spaces between them): a change from a pit to a land = 1, and no change = 0. The recorded data is read using a laser beam.

From code to an image

Encrypting an image as binary data involves converting each pixel of the image into zeroes and ones. A black and white image can thus be converted into 0 for black and 1 for white. There are multiple computerized encryption methods for colors, but the most common is the RGB (red, green, blue) “color space.” It is an additive synthesis system: by using combinations of these three colors, it is possible to reproduce a large part of the visible light spectrum on a screen.

The color encoding is expressed in bits per pixel: 1 bit can store 2 states (0 or 1), 2 bits 4 states (22), 4 bits 16 states (24) and so on. Therefore, encoding using 8 bits per RGB component enables 256 possible shades for each one (red, green and blue), resulting in a total of 16.7 million possible colors (256 × 256 × 256). Each encoding mode produces a certain type of digital file (jpeg, tiff, bmp, gif, png, etc.).

Data center

A data center is a place that houses the essential elements of a company's IT system: computers, servers, storage bays, telecommunication networks… It can be internal (located within the company) or external, and its primary function is the storage in digital form of all the data needed for the company's operations. With the proliferation of online devices and ever-increasing needs for data storage and processing capacity, data centers continue to grow in size and number. Their seemingly unstoppable development raises many environmental issues (heat generation, electrical consumption…).

The Arecibo message

Written by Dr. Frank Drake of Cornell University (USA), the Arecibo message was broadcast into space in 1974 as a radio signal targeting M13, a globular star cluster in the Hercules constellation located about 22,200 light years away and considered a potential host of extraterrestrial life. Contained in a 73×23 pixel black and white image, the message conveys information about Earth and humanity, including the DNA helix, a sketch of a human being, the population of Earth, the solar system and the atomic numbers of elements like hydrogen and carbon. As of November 16, 2018, 44 years after its transmission, the Arecibo message has traveled 44 light years from Earth.

The Bayeux Tapestry

Also known in France as the "Tapestry of Queen Matilda," after the wife of William the Conqueror, the *Bayeux Tapestry* is an embroidery dating from the 11th century that takes the form of a long strip, about 50 centimeters wide and 70 meters long. It represents the events preceding the Norman Conquest of England: the end of the reign of the English king and the key events of the Battle of Hastings. Interpreted as an instrument of Norman propaganda serving William the Conqueror as the new King of England, this tapestry, through its form and content, inspires reflection on communication media and the meaning of data over time.

8. Algorithms

FORMS OF ALGORITHMS, 2015
RAPHAËL PLUVINAGE
GRADUATION THESIS UNDER THE SUPERVISION OF SOPHIE COIFFIER,
ENSCI-LES ATELIERS
POSTERS 120 X 80 CM. INKJET PRINTING

Reading e-mails, answering them, choosing the nicest photo, refusing a bank loan, adjusting a price according to an impression of the customer… All of these are daily activities performed by algorithms. An algorithm, a finite series of operations or instructions to be followed in order to accomplish a task, is in most cases executed by an electronic device. An integral part of nearly all facets of modern-day society, these software-driven machines are becoming more powerful all the time. In parallel, the potential of algorithms is becoming more diversified. The bodies of data upon which these invisible automatons rely are also increasingly diverse, more easily available, greater in quantity and ever more interconnected. In a world characterized by the massive accumulation of data and broad surveillance of the networks by national security agencies, where personal data has commercial value, it seems important to understand how algorithms use this information to perform their tasks.

Forms of Algorithms comprises seven chapters offering an investigation into seven types of algorithms. These studies were conducted by various people, some real, many invented, professional or amateur, famous or unknown, accidentally or intentionally. Their fields of activity and original motivations may be different, but their technique and results are similar. The project spans the range from an algorithm developed to classify 3,000 pills with different shapes and colors (“Automated Ecstasies”) to the “Adrenaline Algorithm,” which perceives the shapes of roller coasters as the results of an algorithm whose variables are human beings and their emotions.

Rather than constituting a general theoretical study, these various investigations are arbitrary incursions, different viewpoints on the way in which algorithms permeate and influence our lifestyles. However, the questions they pose are interlinked, hinging on the problem of algorithmic governmentality, the structures underlying the power of algorithms and their study.

ACKNOWLEDGEMENTS

CURATOR, SCENOGRAPHY AND GRAPHIC DESIGN

Studio Pinaffo Pluvinage

THE MUSEUM WOULD LIKE TO THANK

Château Haut-Bailly,
mécène d'honneur

THE STUDIO PINAFFO PLUVINAGE AND THE MADD-BORDEAUX THANK ALL THOSE WHO CONTRIBUTED TO THE SUCCESS OF THIS EXHIBITION

Léo Baqué
Nina Capron
Marine Dallennes
Tamara Efrat
Juliette Gelli
Gauthier Nadaud
Xavier Pinaffo
Simon Richard

Les ateliers du pôle technique de Bordeaux Métropole
Les élèves de l'ICART Bordeaux
Lézard Graphique
Média Graphic
Procédés Chénel International
Smiirl

FOR THEIR FIDELITY, THE MUSEUM WOULD ALSO LIKE TO THANK

The Friends and the circle of the madd
Le Chapon Fin
Château Nairac
Les Crus Bourgeois du Médoc
Les Galeries Lafayette
La Société de négoce DIVA

THE MUSEUM TEAM

DIRECTOR OF THE MUSEUM

Constance Rubini

EXECUTIVE ASSISTANT

Karine Normand

CONSERVATION DEPARTMENT

Antonin Macé de Lepinay
Camille Perrot
Etienne Tornier

ARTWORK DEPARTMENT

Giuseppina Ferrara
Alexandre Cordoba
Valérie de Raignac

ADMINISTRATION AND FINANCE DEPARTMENT

Nathalie Balerdi Paternotte
Christine Boubila Brillac
Céline Maire

COMMUNICATION

Carine Dall'Agnol

PUBLIC SERVICE DEPARTMENT

Caroline Fillon
Véronique Darmante, teacher, National Education
Florent Baffoigne, relay teacher

DOCUMENTATION

Delphine Delmares

GRAPHIC DESIGNER

Izaskun Gaspar Ibeas

TECHNICAL DEPARTMENT

Guillaume Birot
Julien Martin

RECEPTION

Joël Berdoulat
Bastien Le Bihan

SECURITY DEPARTMENT

Frédéric Marty
Jean Lepetit
Nicolas Treupel

SURVEILLANCE AGENTS

Sophie Gabal
Fabien Mora
Bernard Noth
Corinne Porge
Marie-Francisca Sevilla

ALL THOSE WHO ARE CURRENTLY PART OF THE MUSEUM TEAM

Luc Blanchet, Julia Bonneau, Raphael Castanet, Anne-Lise Chenesseau, Maxime Daviaud, Kassandra David, Anaïs Defleur, Perrine Flamain, Estelle Galand, Julie Guyon, Camille Jolin, Anna Juhel, Martine Lacrouts, Kamel Nwazou, Dorian Ortillon, Any Ousmane, Pauline Paresys-Barbier, Philippe Passevant, Pauline Perrier, Anaïs Reichner, Karine Romero, Rehia Tepa

musée du design bordeaux *musée des arts décoratifs*

#madd-bordeaux
madd-bordeaux.fr

PUBLISHED IN NOVEMBER 2018