Alive "dividing walls"

"Alive dividing walls" is a project that arises from the workshop "Light, space and perception "developed in MEDIALAB PRADO under the direction of Daniel Canogar, Julian Oliver and Paul Valbuena. This workshop was proposing to investigate and to experiment with the use of the light, the projection and the visual perception from different areas, assembling people linked to the architecture, visual arts, urbanism, scenery, programming, physics, optics, psychology and physiology of the perception, etc.

Our project tries to include the perceptive possibilities of the light in the recovery of urban degraded spaces.

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Synthesis of the project

The project claims the recovery of degraded spaces as the dividing walls, through the light, working with filaments of optical **plastic fiber** and the force of the **wind** as activator of the installation, to transform a depressed area into a place of expression of the **urban culture** and an area of interest into the city.

It is fundamental that the work system of the project is "as "natural as possible", although the raw material is "artificial". We look for the application of "soft", analogical technologies, defined by physical phenomena and not of programming.

It is the game of opposite what we are interested in, the search of one artificial element, which is fed by the forces of the nature, like the light and the wind.

Conceptual memory

"If a place can be defined as a place of identity, relational and historical, a space that cannot be defined as a space of identity not as relational not as historical, it will be defined as a not-place. The hypothesis here defended is that the over-modernity is producing of not-places, that is to say, of spaces that are not in anthropologic places and that they do not integrate the ancient places, contrary to the baudeler modernity. "

Marc Augé

"Not-places" may have a physical presence or not. They are spaces that neither have an anthropologic existence, nor they are a priori defined but they end up shaping the plot of the city and constructing the relation between the inhabitant and the environment. They are silent spaces which usually don't count, normally they pass unnoticed until they turn into a problem and end up by being victims of big actions who eliminate them.

Generally they arise from the loss of use or of identity or through the imbalances that arise in the growth of the cities. One "not place" is the dividing wall or a corner left of the city, but it can be also the hall of a great airport, or a mall. They are spaces that have lost their relation with the man.

Our performance tries to recover these degraded spaces across a mechanism of putting them in value by means of small interventions.

In this occasion, we act on the **dividing walls**, on which we will "plant" thousands of microfilaments of optical fiber that are stimulated through the movement, so that they act as a field of wheat, which draws multiple geometries with the wind …

We generate an artificial forest, a "fictitious" nature that nevertheless is ruled by the same natural laws, that is to say, they need the forces of the nature to live.
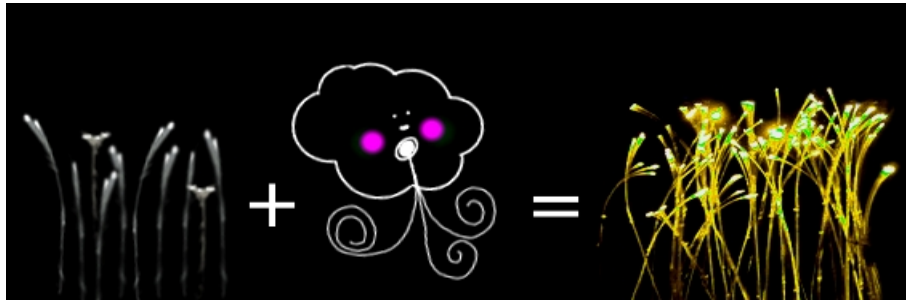
With this operation, the dividing wall passes from being a residual space to turning into changeable linen, which self illuminates and is consolidated as an atractor of activity around it, an icon, a point of interest, a projection of an artificial nature in a fully urban environment.

Technical memory

The movement of this plantation of microfilaments of light will be determined by the same principles that govern the movements of the fields of wheat that swings with the wind or of the big colonies of marine algae that dance to the sound of the tides, as metaphor of an artificial nature.
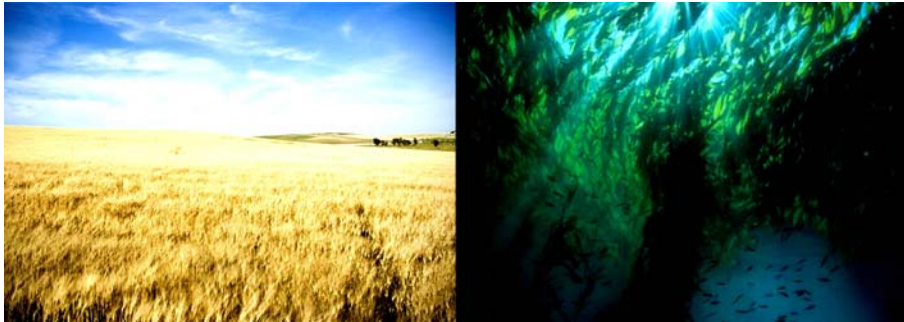
It is fundamental to establish the **SUPPORT** or place of installation of the project, which can be quite diverse and in many different dimensions.

Depending on the place of installation, we have developed two prototypes: the first one is called **"analogic prototype"** and is based on soft technologies (not media systems) and it's thought for big surfaces. The second one is called **"technologic prototype"** and is based on programming systems and it's much more appropriate for a limited number of modules.

The **base material** is the **optical fiber of flexible plastic** in both prototypes and it is determined by its high flexibility and sensibility to the effect of the wind.

Due to the working scale it is fundamental to give much more entity to the filaments of optical fiber, in order to obtain the visual power adapted in comparison with the dividing wall.

That's why, in both cases, we will work with bundles of fiber of approximately 150 filaments and a changeable length of among 25 and 5cm, arranged in a descending way inside the bundle. Thus, we will achieve that the material gets a suitable relevancy.

The project tries to take advantage of the qualities of the optical plastic fiber as a transmitter of light and to experience all its possibilities. For it, diverse essays have been realized obtaining different types of light emission:

- Emission in the final top of the filament.
- Longitudinal emission (that is obtained on torning the fiber with a cutting element).
- Punctual emission along its length (that is obtained on cutting punctually the fiber).

Every bundle of fibers together with its corresponding led and its supply forms a MODULE.

V1.0 analogic version

In this version we estimate a project which support is a dividing wall with a high wind exposure. First we will suppose that the installation is approximately 50 m2 with dimensions of 10 m length and 50 m height.

In this case, the fiber optic bundle will be retro-illuminated with a LED of white light, to 6 volts and with a consumption of 3 w, that allows to contribute light of changeable intensity, they present a great permanence and do not suffer a high warming with the use.

Every module will have an independent behaviour that will depend on the exposure to the wind that it has. The wind will dictate the switch off and ignition of the led that transmits the light to the fibers.
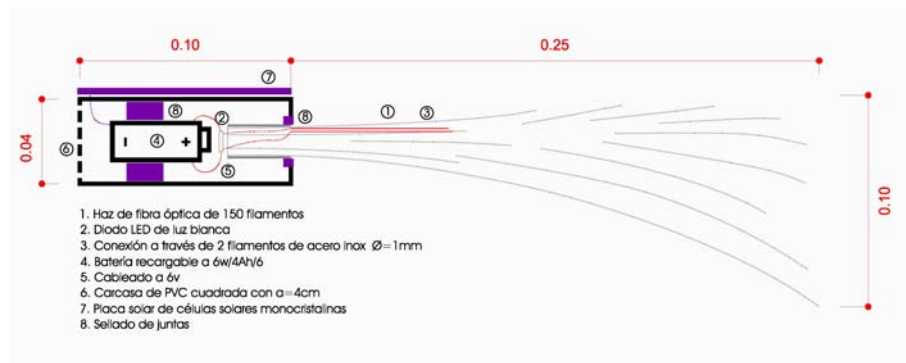
MODULE = BUNDLE OF FIBERS + LED + BATTERIES + SOLAR PLATE

The energetic supply will fulfil across a few batteries integrated to the module, connected to a solar plate of small dimensions, located in its

exterior surface that allows every module to have an energetic autonomous behaviour.

The technical specifications of each one of these elements are as follows:

- Led with light power of 3w.

- Solar panel of solar monocrystalline cells of 6w and approximate dimensions of 4cm x 10 cm

- Rechargeable battery of 6w/4Ah/6v

1. Haz de fibra óptica de 150 filamentos
2. Diodo LED de luz blanca
3. Conexión a través de 2 filamentos de acero inox Ø=1mm
4. Batería recargable a 6w/4Ah/6
5. Cableado a 6v
6. Carcasa de PVC cuadrada con a=4cm
7. Placa solar de células solares monocristalinas
8. Sellado de juntas

The electrical connection, that is, the closing of the circuit to obtain the lighting of the led and consequently of the fibers on top, is obtained though two filaments of steel of 1 mm of diameter and 10 cm of length that are connected to each of the poles and inserted in the bundle, so that with the wind presence, they will have an oscillating movement that will make them get in touch and so finally close the circuit.

In general what we pretend is the analogy of the dividing wall as a great linen in which every module is a pixel, so that occurs multiple situations of randomly, so it could happen that the wall is not suffering any type of wind and the fibers remain switched off and with no movement.

viento fuerte   viento moderado   ausencia de viento
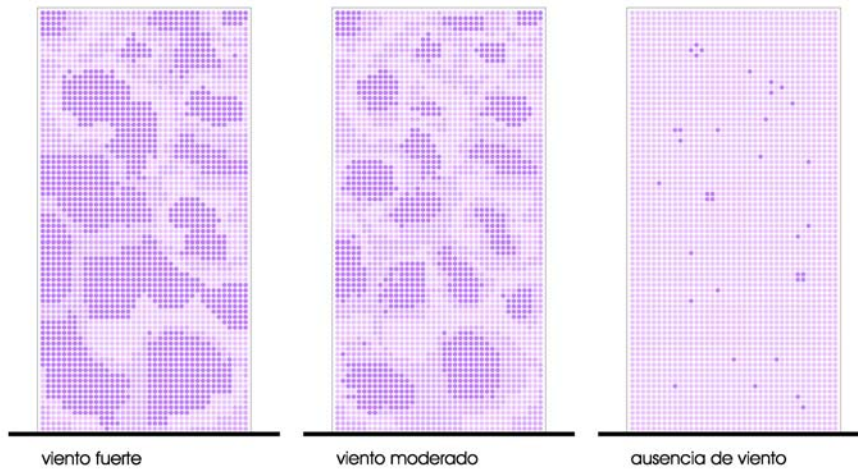
These "modules-pixels" will be placed forming a two-dimensional framework, with separations between axes of 12,5cm and will be anchored with rigid pipes of pvc (of insulating material) that will contain the cables for the energetic supply of the leds.

With this configuration 49 modules will be placed for one m2 and in the case of the dividing wall of 50 m2 that we are valuing, 2.450 modules would be needed, which generates a great number of random combinations.

It is fundamental that the dividing wall continues having an important presence, so that the structure of the modules is designed under a few exact parameters to minimize its presence.

For it, the anchorage fulfils the dividing wall across a double structure:

    - HORIZONTAL:

Pieces in U-shape of stainless steel placed in horizontally every 2m in the longitudinal sense of the dividing wall.

- VERTICAL

Structure of steel cables lined in transparent plastic, of Ø =2mm anchored to the main frame and that are placed on both sides of the modules, attached to these across prisoner screws, so that they guarantee the fixation of the modules and their capacity of movement with the wind action in the horizontal axis.
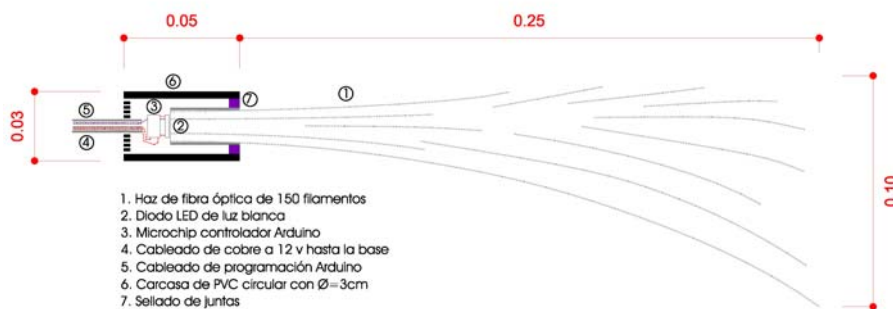

diámetro abarcado por el haz de fibras en extremo

1. MÓDULO DE LED+BAT+PLACA+HAZ
2. CABLE DE ACERO Ø=2MM
3. PERFIL EN U DE ACERO L=3CM
4. TACO DE ANCLAJE Ø=1,5CM
5. TORNILLO PRISIONERO
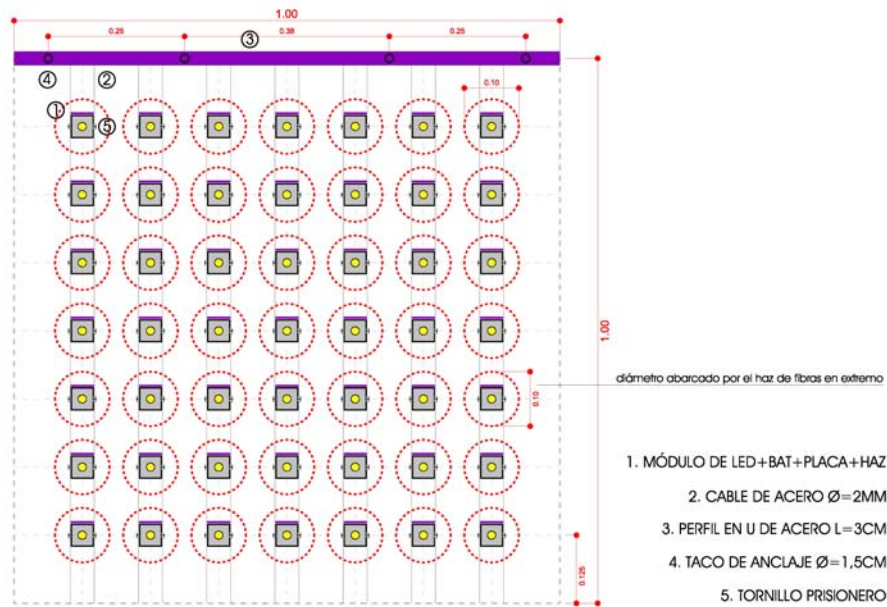
So, the metaphor is complete: "the artificial plants are illuminated by the wind and they feed with the light, as the natural plants, only that the process of photosynthesis is different".

V2.0 technologic version

This second version is proposed for smaller surfaces or irregular spaces in which not such a big number of modules is needed, because its work is controlled by an Arduino platform that has a limited capacity of transmitting information.

In this case, the bundles will be retro-illuminated with a LED of white light, to 6 volts and with a consumption of 3 w. Every module will have an independent behaviour that will be dictated by a microchip controlled and programmed across the platform Arduino.

1. Haz de fibra óptica de 150 filamentos
2. Diodo LED de luz blanca
3. Microchip controlador Arduino
4. Cableado de cobre a 12 v hasta la base
5. Cableado de programación Arduino
6. Carcasa de PVC circular con Ø=3cm
7. Sellado de juntas

MODULE= BUNDLE OF FIBERS + LED + MICROCHIP

The programming will dictate the switch off and ignition of the led that transmits the light to the fibers based on the wind quantity, which will be registered by an ANEMOMETER located on top. So it will work as if every module was a pixel of a great linen (that is the dividing wall) in which to define the drawings that are formed by the different densities of wind.

These "modules-pixels" will be placed forming a two-dimensional framework with rigid pipes of pvc (of insulating material) in a regular or irregular net, that will contain so much the cables that transmits the information from Arduino's plate to the chip as the cables for the energetic supply of the leds. This generates a great number of random combinations.

V viento= 16-25 m/s   V viento= 6-15 m/s   V viento= 0-5 m/s
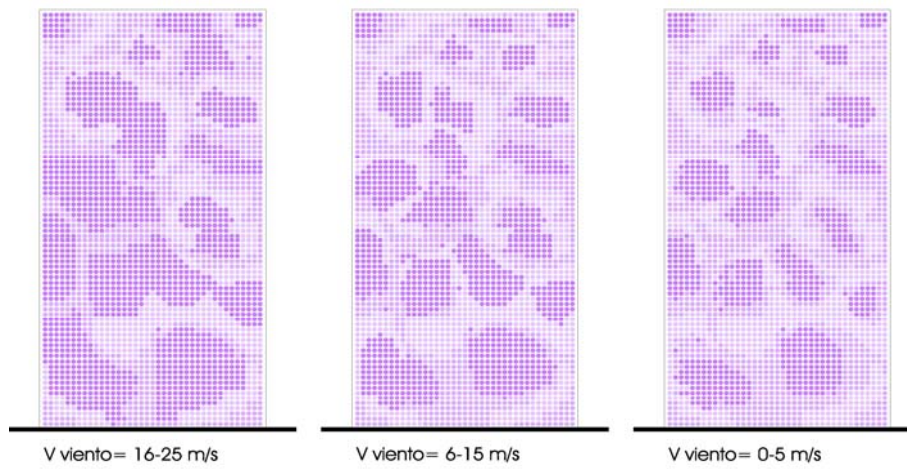
The supply will be electrical to 6 volts and will come from a battery that will be fed by a solar photovoltaic plate measured in every case to feed to all the existing modules.

① ② ③

1. PLACA SOLAR FOTOVOLTAICA
2. BATERÍA ELÉCTRICA
3. ANEMÓMETRO
4. PLACA ARDUINO
5. MÓDULO FIBRA+LED+CHIP

⑤

④
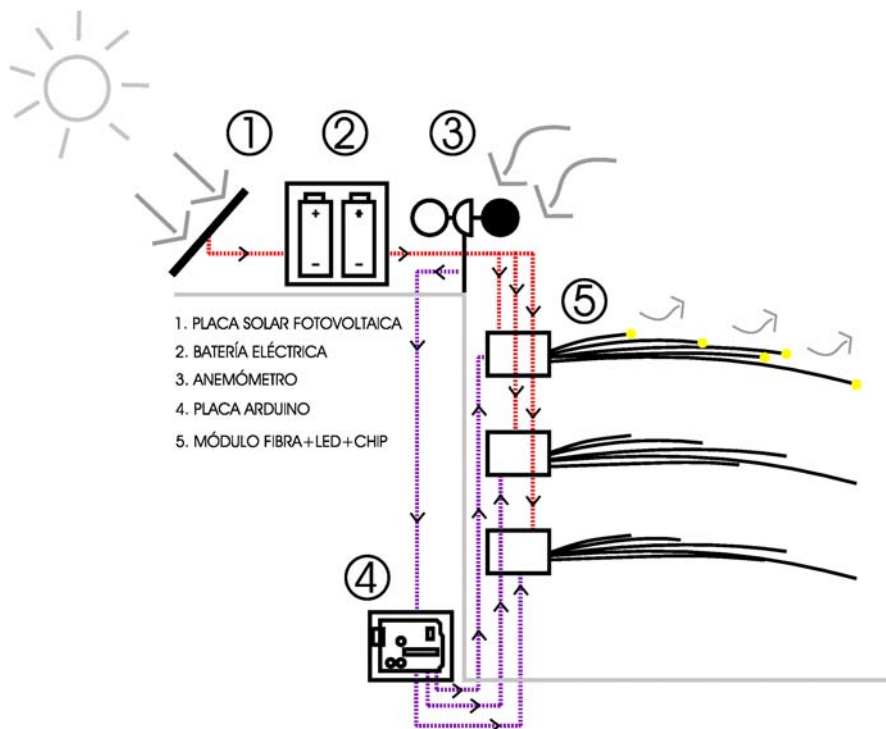
Graphic information

IMAGES OF THE CONCEPTUAL MODEL

This model developed in the first meeting of the Workshop " Light, Space and Perception " in Medialab Prado, tries to reproduce the dividing wall to an approximate scale of 1/20 and to simulate the effect that we want to provoke in the dividing walls.
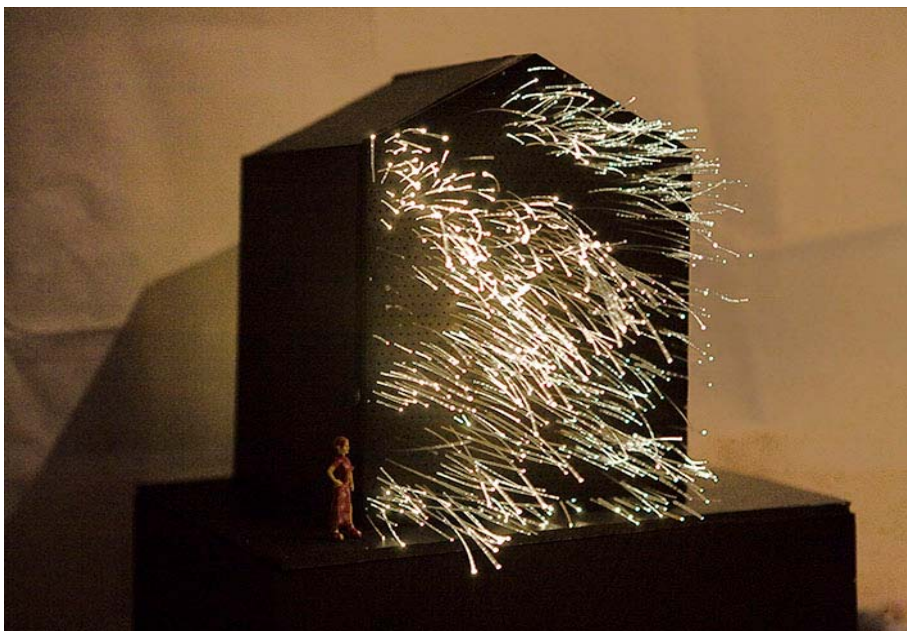
We built a support in foam core board, which is crossed by approximately 2.500 filaments of optical flexible fiber of 30 cm length joined in a bundle that is illuminated across a halogen. The variation of lights and shades is obtained by means of a disc placed between the light source and the fiber. The disk rotates by the force of a small engine that presents alternation of opaque, translucent and transparent zones.
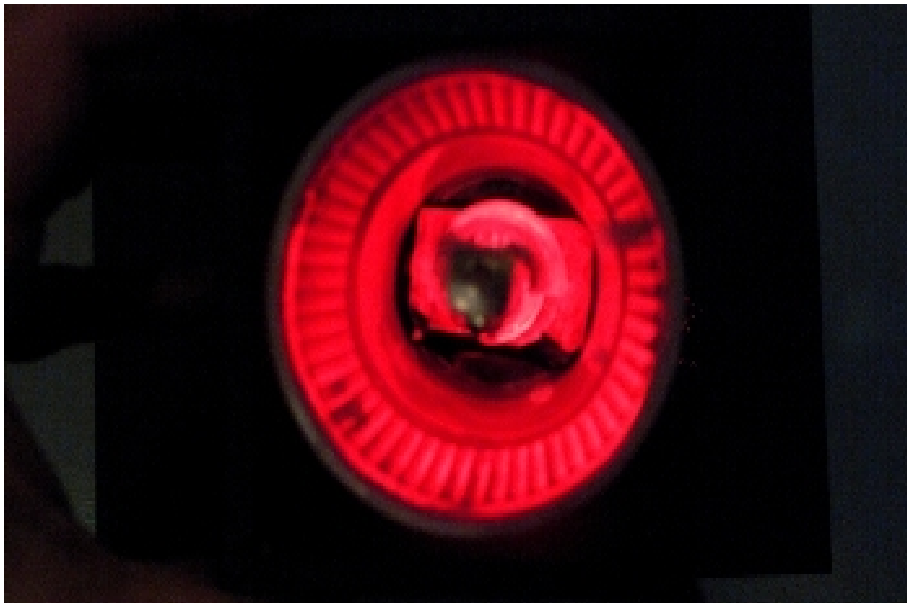
IMAGES OF THE MODULE PROTOTIPE

In this first Workshop we wanted to try equally the viability of the project trough the execution of a module in fiber.
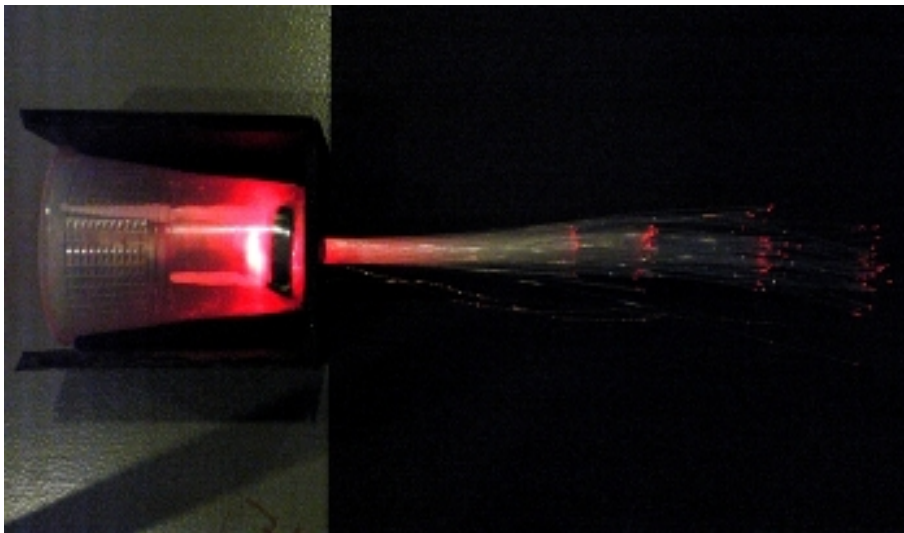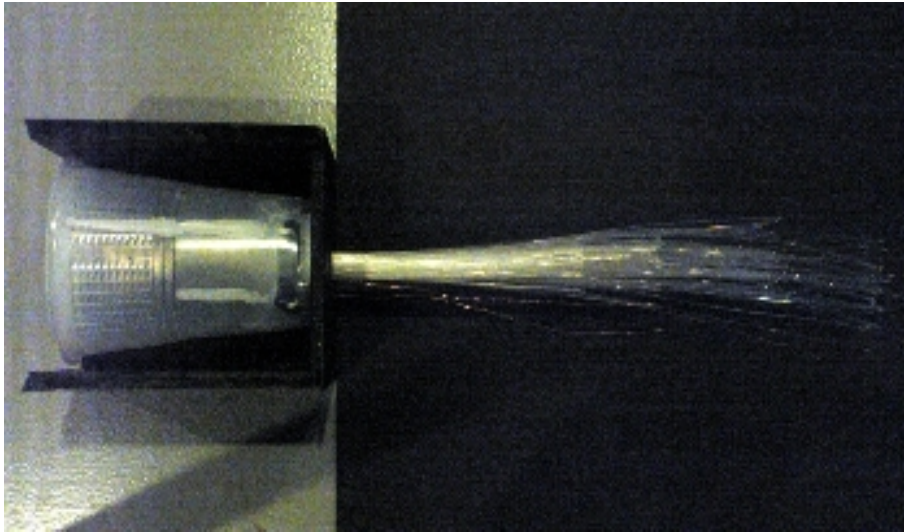
For it, we generate a bundle of fibers of diverse lengths up to a maximum of 25 cm, in rising order inside the bundle (so, the fibers of major length are placed in the low part and those of minor length in the top part of the bundle).

The bundle of fibers is isolated from light with black tape. In the end of the bundle a led is placed (that in this occasion is red but it could be in any other colour) connected to 3 batteries of 1,5 v.

The circuit is connected trough both ends with 2 filaments of copper, so that the circuit is closed by the action of the wind that joins the filaments, the led switches on and transmits the light to the filaments of fiber in top.

IMAGES OF THE "MODULES IN A NET" PROTOTIPE AT 1/1 SCALE

In the second meeting developed in the Workshop "Light, Space and Perception" promoted by Medialab Prado, we proceeded to the elaboration of a prototype at a real scale of the structure that could be placed in the dividing wall once it's built.

Since it was an experimental prototype, we tested two systems of functioning of the set, based on the system of energy supply of the modules:
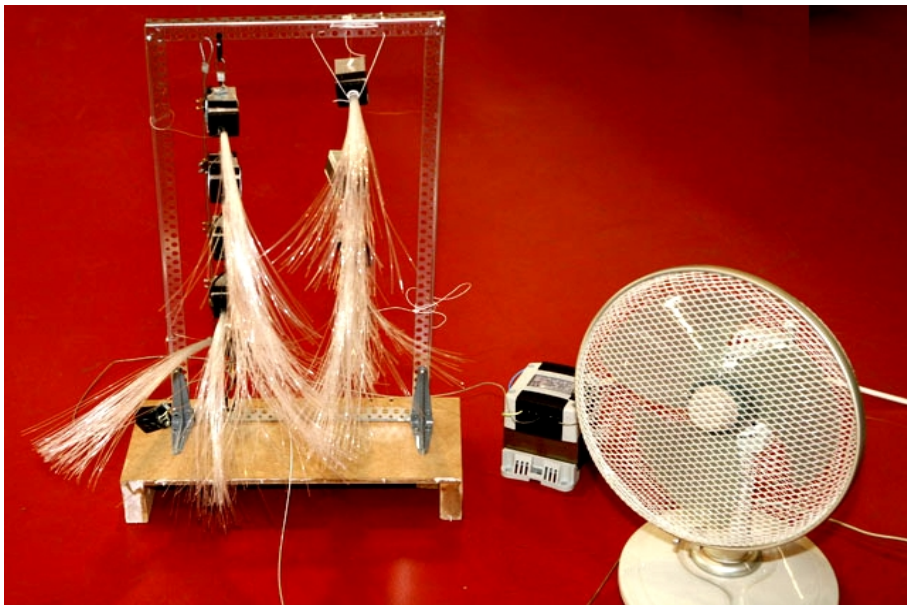
   A. EPHEMERAL SYSTEM: Supply with an external battery for all the modules.

   B. PERMANENT SYSTEM: Supply with individual batteries in every module

The structure is common to both prototypes and it consists on a frame of aluminium of 60cm X 30 cm and a support of wood.
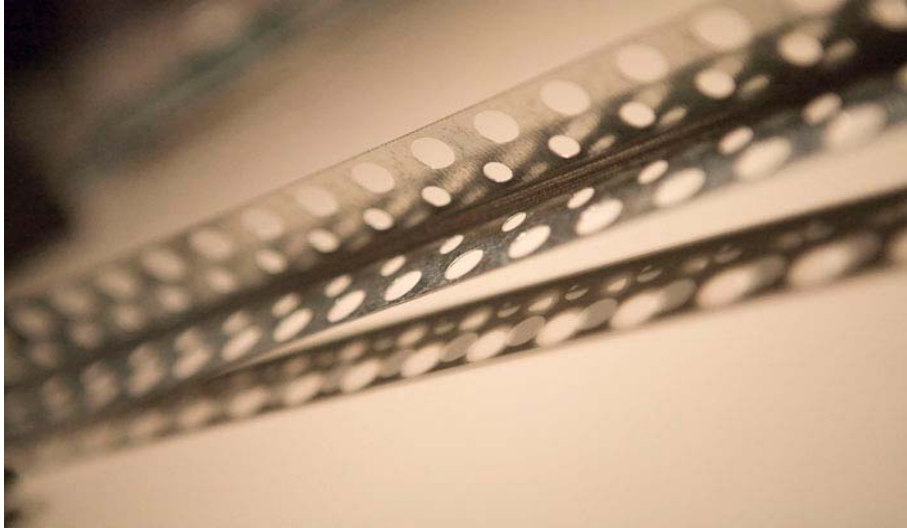

The force that activates the prototype in both cases is a ventilator that simulates the force of the wind.

A. EPHEMERAL SYSTEM

The modules are autonomous at an energetic level. Each one is fed across 4 batteries of button of 1,5v. The lighting is done by leds at 12v and 3w. The modules gather together with threads of nylon, so that the presence in the dividing wall is invaluable.

The circuit, like in the previous workshop prototype, is connected in its ends to 2 filaments of copper, so that the circuit is closed by the action of the wind that joins the filaments. The led switches on and transmits the light to the filaments of fiber in top. Thus, the connection of each one of the modules inside the dividing wall is independent from others.
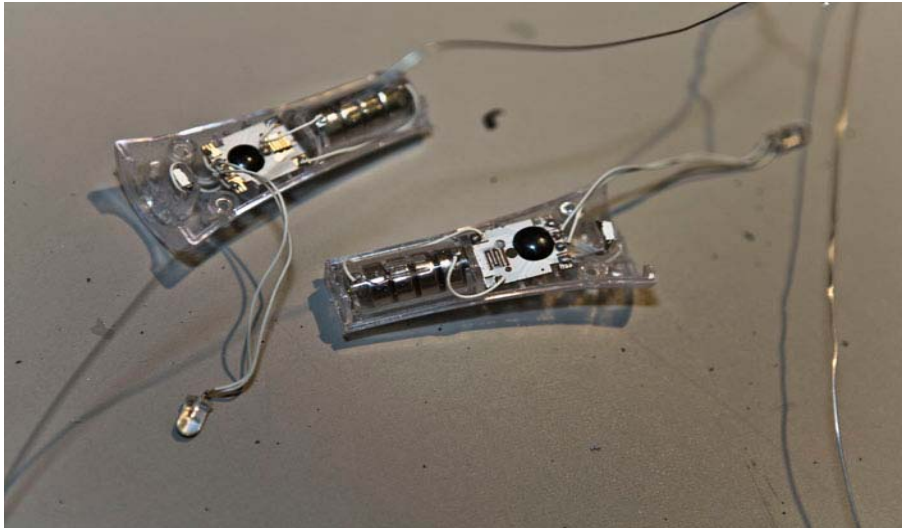
Advantages and disadvantages of the system:

This system allows an independent ignition from every module and the randomness is total, so the functioning depends exclusively on the force of the wind and does not need of any programming system. On the other hand, totally auto manageable modules can be obtained at an energetic level.

The problem is that if a piece suffers a breakdown, its reparation in the dividing wall turns out to be very complex.

B. PERMANENT SYSTEM

The modules feed across a battery, but the connection is made in an independent way in each of them, since the circuit is closed or opened for every module depending on the wind.
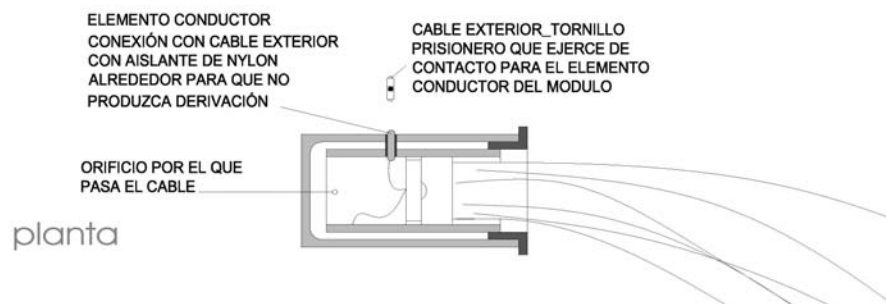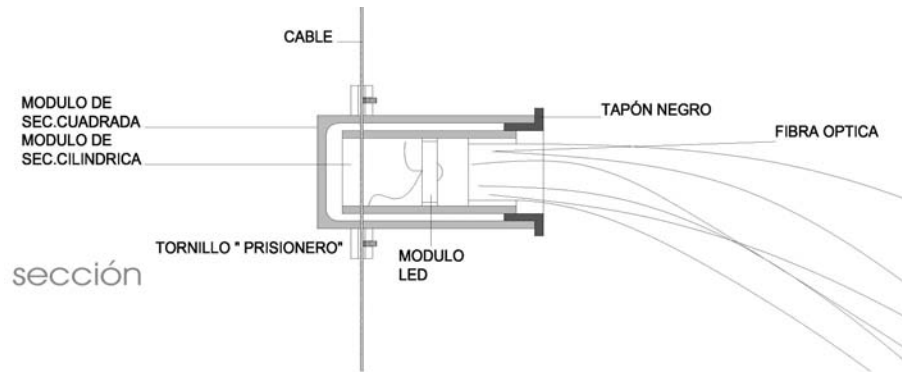
The circuit is composed by two cables of steel of 3mm of diameter. One of them sustains the modules and other one goes in parallel. This second cable presents a few pieces that allow the connection in several points with the module, which equally has a point of connection. When the force of the wind joins them, the circuit is closed.

The lighting is obtained, in the prototype, by means of halogens to 12v and 10w, with G4 anchorage type.
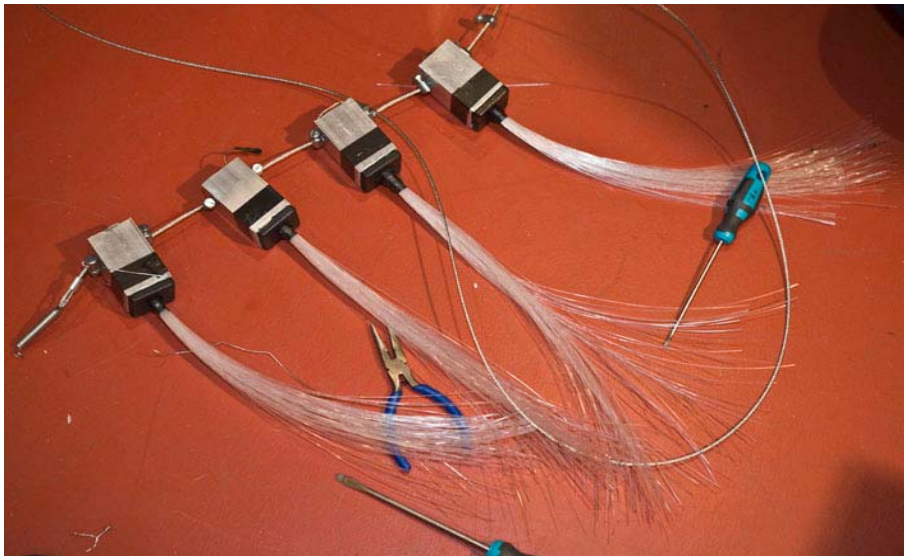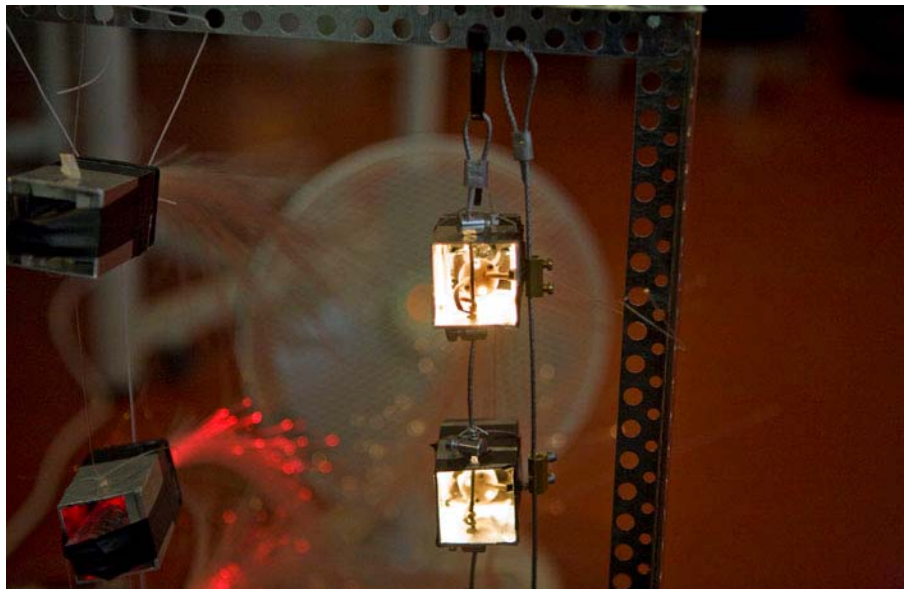

Advantages and disadvantages of the system:

This system allows a bigger versatility and it does not exist the problem of a lack of energetic supply of any unit. Nevertheless, as the cables are duplicated, it may have a presence in the dividing wall that there would be necessary to consider in the definitive installation.

CABLE

MODULO DE
SEC.CUADRADA
MODULO DE
SEC.CILINDRICA

TAPÓN NEGRO

FIBRA OPTICA

TORNILLO " PRISIONERO"

MODULO
LED

sección

ELEMENTO CONDUCTOR
CONEXIÓN CON CABLE EXTERIOR
CON AISLANTE DE NYLON
ALREDEDOR PARA QUE NO
PRODUZCA DERIVACIÓN

CABLE EXTERIOR_TORNILLO
PRISIONERO QUE EJERCE DE
CONTACTO PARA EL ELEMENTO
CONDUCTOR DEL MODULO

ORIFICIO POR EL QUE
PASA EL CABLE
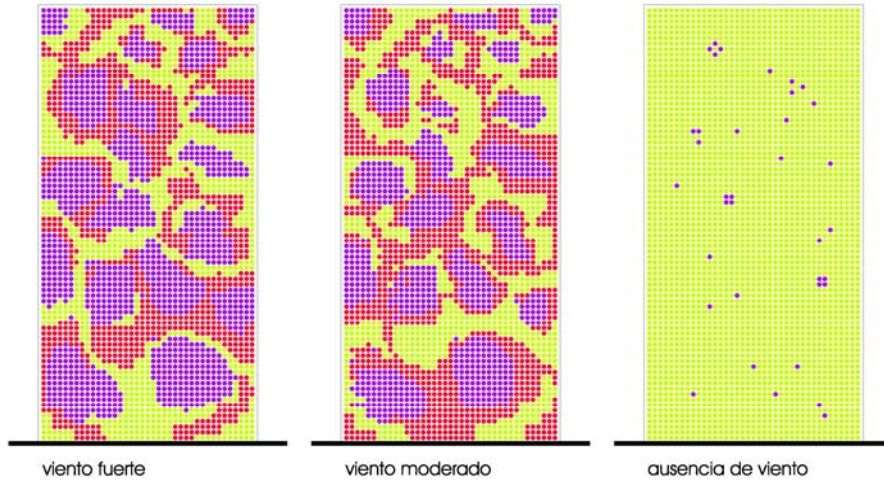
planta

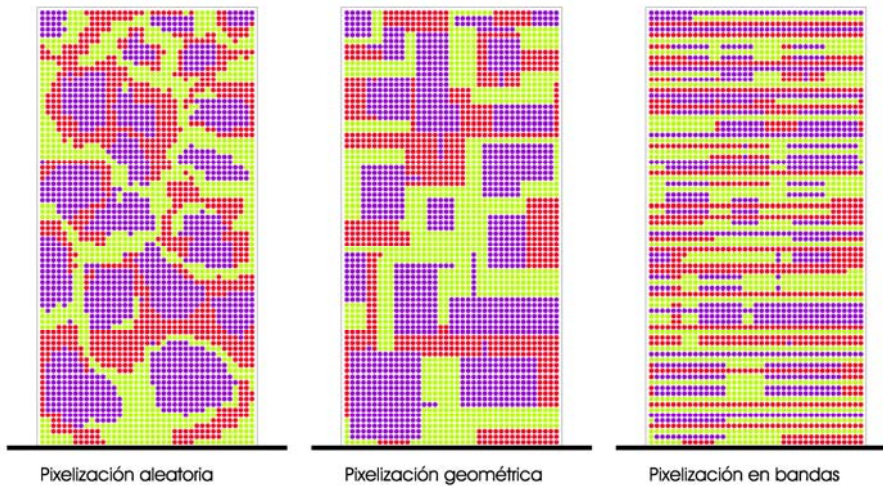Detail of the module and connexion system to the net prototipe.

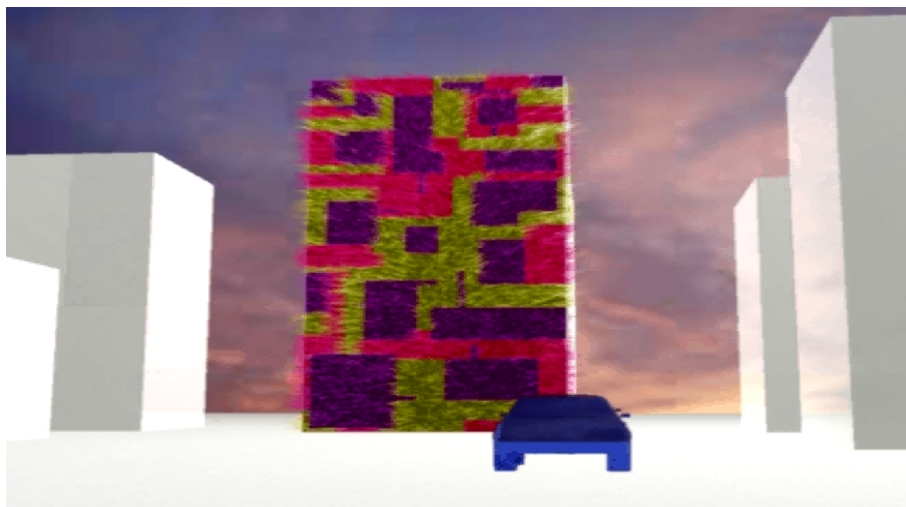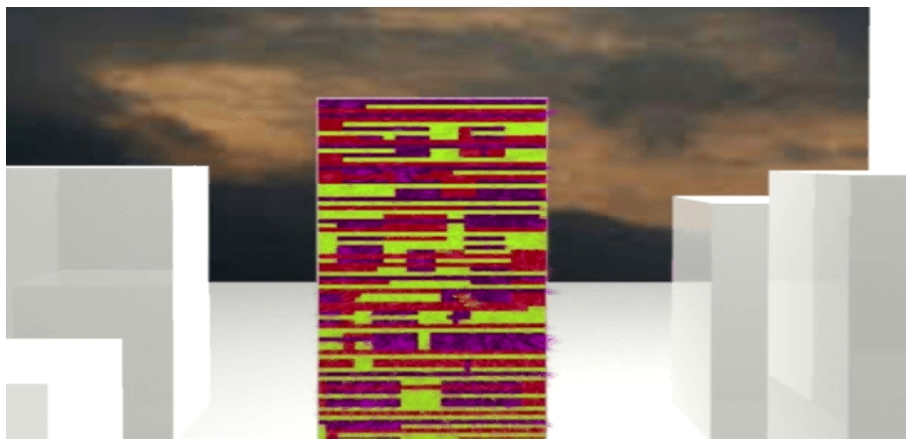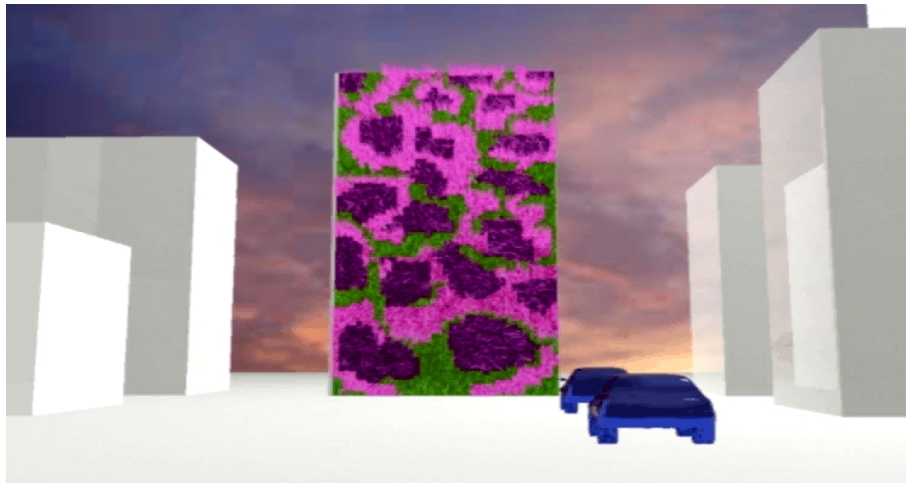**Note:** *all of the images are property of Lourdes Caicedo.*

POSSIBLE VARIANTS OF INSTALLATION OF THE PROJECT

1a. Modules with leds RGB to form fronts with chromatic variations in the analogical version.

viento fuerte   viento moderado   ausencia de viento

1b. Modules with leds RGB to form fronts with chromatic variations in the technological version.

Pixelización aleatoria   Pixelización geométrica   Pixelización en bandas
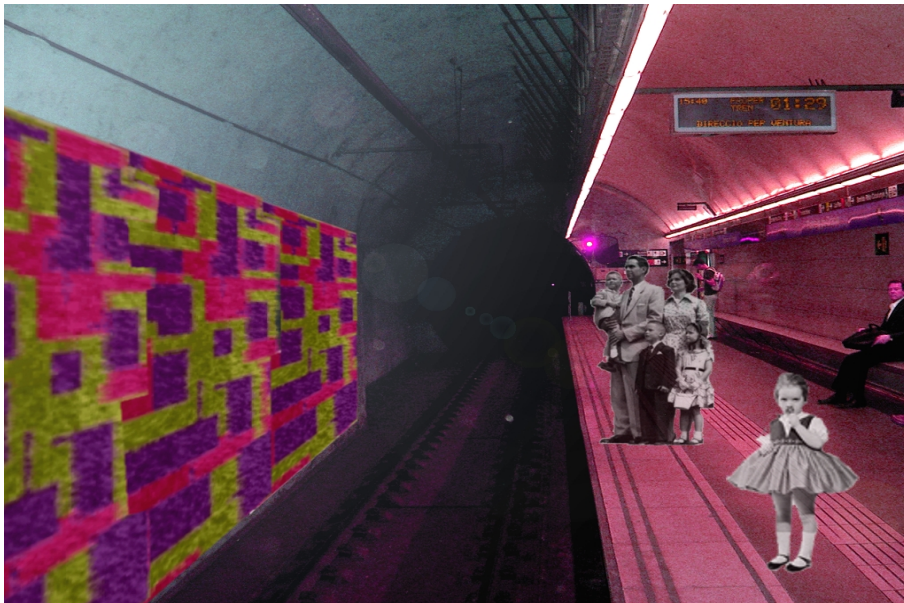
2. Small lines of filaments that induce the reflection on urban unnoticed elements.
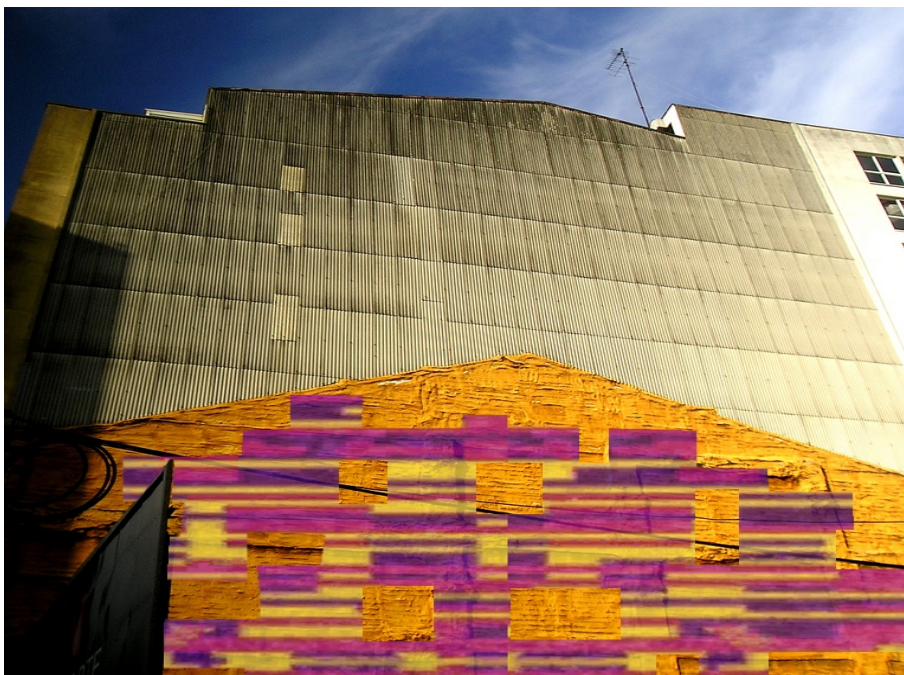

3. Placement in spaces of transit so that the dividing wall reacts with the users' flow.

4. Installation in the tunnels of the underground to take advantage of the speed of the trains and the turbulence that they generate to, that would activate the system.

5. Placement in the dividing wall like a collage, creating random drawings, not placing them in the whole surface.

Brief biography of the artist

Belén Butragueño Díaz-Guerra (Madrid, 1977) is Architect at ETSA of Madrid (Polytechnic University) since 2002 graduated with Honors and has finished her studies of Doctorate in this University in the Department of Architectonic Projects. She is Professor of Drawing and Analysis at ETSA of Madrid and has been Professor of Projects and Analysis at SEK University in Segovia for last the four years.

She began her professional activity as collaborator in diverse Offices of recognized prestige, among which stands out the Dutch Office MVRDV in Rotterdam.

At the present time she is working on the configuration of a space of creation called B2bConcept, that pretends to be a laboratory of experimental architecture, very in touch with other artistic and scientific disciplines, in which the creative labour is based on the research of the fields of opportunity that are opened in the contemporary world.

In this sense, she has written diverse articles that question the current city planning approaches, as they are: "In search of The Lost Ark", Magazine I THOUGHT (relative to the enormous growth of the Spanish metropolis), "Networks", Magazine SKAFANDRA N ° 5, 2008, or "Planned City versus Spontaneous Cityz", published in the Digital Magazine ARCHFARM.

Her work has been chosen to participate as an author in the 44th INTERNATIONAL CONGRESS ISOCARP " Urban Growth without Dispersion ", with the paper " New Networks for the old Paradise ", that will be developed the next month od September in Dalian, China. Her paper puts in question the overexploitation of the coastal paradise of the whole world and proposes the search of a better integration between the tourist and the inhabitant of the above mentioned environments.

Her last conference given in the University of Castilla–La Mancha, at the Technical College of Cuenca, within the II Edition of the Master of Building and Digital Home in April, 2009, affects the importance of including the new technologies in the design and restructuring of the contemporary urban space, in the search of " The Space of the Cyberspace ".

Several of the Urban Projects developed by B2bconcept have been spread through Magazines such as "Vía Arquitectura", "Pasajes de Arquitectura", "CSCAE", "Arquitectos de Madrid" (magazine of the Official College of Architecture of Madrid) or "Piedra de Toque".

Within its more relevant projects stand out the Remodelation and Regeneration of the historical Centre of Chipiona, Cadiz; in collaboration with Dintra5 Engineers and the Office MVRDV (Rotterdam, Holland), the First Prize in the Competition "DISSONANCES, art for the Innovation", together with Carmen Paz and Diego Soroa in Bilbao or the Project of Cultural Centre of New Technologies, Leisure and Restoration that B2bconcept is projecting together with Diego Soroa at Gran Vía in Bilbao.

On the other hand, it is necessary to emphasize that in spite of being a Young Office, they have already developed a School of Infantile Education, a Restaurant, a Design Hairdresser's and three Singular Houses. In these projects, the office supports its researching and experimental conception of architecture, so that both the creative processes and the constructive procedures are based on the searching of new acting strategies, compromised with the program, the global environment, the materiality and the specific conditions of each problematic.

Her office has been included in the Week of the Architecture of Madrid 2008, inside the program REFRESH, destined to promote the labour of young emergent architects. Recently, she has taken part in the Cycle of Central Conversations developed in the Bookshop "La Central" of the Museum Reigns Sofia of Madrid.