The Global Studio

Community Architecture in Extreme Environments

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Technion Material Topology Research Laboratory (MTRL)
Intensity / The Rio operations centre, COR, brings the city’s 30 departments and private suppliers into a single control room. Photograph: David Levene for the Guardian
Human | Nature | Technology

Intensity
Information Screening

Extensity
Information Streaming

Potentiality
Information Sampling
Azrieli Global Studio 2017
Technion, Israel Institute of Technology

SCEFFERVILLE
CANADA

AARON SPRECHER
global studio 2017

special thanks to
THE AZRIELI FOUNDATION
chapter 1

CANADA TRIP

April 21-30, 2017

In April 2017 Technion Global Studio made its first Canada trip. The objective of the trip was to learn about Canadian Nordic cultures and communities, to meet McGill University’s architecture students and to establish communication with them.

As a part of the trip, which was generously sponsored by Azrieli Foundation, Israeli students got an opportunity to visit such places as Misteo Salle’s Habitat 67 and Buckminster Fuller’s Biosphere, Société des Arts Technologique (SAT), Contemporary Museum of Montreal (MAMC) and Canadian Centre for Architecture (CCMA). Technion students got a session of workshops about research stations’ architecture and about Nordic architecture in general and participated in Canadian students’ final reviews as well.

One of the most important parts of the course-initiated trip to Svalbardia, Northern Quebec, via Quebec City. During the trip, Israeli students got an opportunity to feel climate changes and to learn about social and cultural aspects of local people life.
RIGHT | McGill University Global Studio final review
BELOW | visiting The SAT, Montreal

ABOVE | tour of the Quebec Old City by Art Historian Marc Orligne
LEFT | visiting The Musée national des beaux-arts du Québec (MNA)}
chapter 2

ATMOSPHERIC MACHINES

After coming back from Canada Israeli students were asked to recreate their experience in a new and very individual form using the infrastructure provided by VisLab (visualization laboratory).

As a part of the exercise eight short movies were created and represented to the Technion's main teaching stuff and to the administration of the Technion's Architecture faculty.

The topics of the movies represented different aspects of the trip, whether it was a cultural familiarization and interchange or “tourist” perspective; the nature’s wealth and uniqueness or urban development and industrialization tendencies.

“Atmospheric machines” is a conceptual exercise which included learning new tools and prepared the ground for the studio project.
A step, another and another one

You rise
Lilach Shifrin & Sheer Han | “Aqua Pura”
Roni Karni | "From the Inside"
chapter 3

SHEFFERVILLE RESEARCH STATION

This section of the book is dedicated to students’ projects.

The proposals explored different aspects of the
research station architecture. While some of the
projects are oriented to Shefferville specific
d climatic, cultural and local aspects, others
represent more universal approach of architecture
in extreme conditions.

One of the most significant challenges was to
implement modern technological approaches
using accurate design and planning tools in
human-scale building designed for researchers
and their potentially long-term work. Another
possible option involved development for local
people and their needs, whether it is a community
center, entertainment spot or educational center
considering summer programs for McGill
University students.

Most of the projects were produced in groups
reflecting a vision of architecture as a collaborative
and scientific field of knowledge and creation.
The form of the project is defined by the cultural context of the users, the climate conditions, the circulation and the contemporary building technologies. All those layers of information create a holistic experience. Layering our design in terms of program, insulation, sense of privacy and changing atmospheres, we created a protective center for cultural and creative activity - a cinema cultural center. The materiality derives from the texture we’ve seen in the region’s nature and cultural heritage, as well as in Canada in general. It is emphasized and amplified to provide the users with a diversified sensual experience on the background of the monochromatic tundra. We propose a public cinema center for the northern First Nation communities, combined with a research facility for McGill University. The integrated volumes articulate the integrated two functions and provide an architectural landmark for the region.
European Canadians
Permanent dwellers of the town, along with their families. Moved to the north recently or in the 50's, to work in services or with the mining industry.

Innu
First Nation group originated in the region. Traditionally lived in seasonal housing, but today took over many of the abandoned miners' houses.

Miners
Canadian or foreigners who work for the mining industry on a "fly in - fly out" basis. Live in the vicinity of the mines but come to the town for leisure.

Researchers
McGill operates a research station in Schefferville throughout the summer months. They usually bring most of their own supplies and do not rely on local inventory.

Plan Nord
Canada recently put in motion an initiative for developing the northern areas of Quebec. It includes economical, social and ecological aspects. There is a lot of criticism regarding it being beneficial mainly to the iron mining industry.
The Kayak as an Inspiration to Coping With Climate Conditions

The climate conditions in Schefferville are extreme, being 30°F and very close to the Arctic Circle.

The First Nation groups who live in the northern territories of Canada developed unique methods to confront the climate.

An example of such a method is the use of kayaks not only as a means of transportation but also as a shelter against the wind. When hunting in the wild and caught up in a storm, the Innu used to take their sledge and place it perpendicular to the direction of the wind. Then, they'd climb into it and shelter inside of it until the storm passes.
**Materials**

- **Stainless Steel 1.5mm**
  - Stainless steel is an extremely resilient material which can withstand the extreme weather conditions in Schottland.

- **EPDM 3mm**
  - EPDM (Ethylene Propylene Diene) is a highly flexible and tear-resistant material. It is also resistant to harsh weather, bringing both an aesthetic and functional advantage.

- **GRC Tiles 50mm**
  - Glass Reinforced Concrete is resilient to extreme climate conditions and can be easily formed into 3D tiles.

- **Aluminum Space Truss**
  - Aluminum is corrosion-resistant and highly suited for extreme low-temperature service. Therefore, it is used for the exterior shell's space truss structure.

- **Glass Mineral Wool 200mm**
  - Made from melted glass, it provides high-threshold insulation.

- **3D Printed Ceramic Ties 40mm**
  - Ceramic tiles are printed with a laser to replicate matrix forms. Local culture used to make kayaks, houses and tools from these bases.

- **Double Glazed Glass 40mm**
  - Openings in the outer shell insert natural light and provide a greenhouse effect during winter, reducing energy consumption.

- **ETFE 5mm**
  - An ETFE (Ethylene Tetrafluoroethylene) system, which is lightweight and transparent, provides excellent ventilation. ETFE maintains the qualities in conditions of extreme cold.

- **Aromatic Red Cedar Panels 20mm**
  - Wood is a natural composite that undergoes expansion and contraction. Therefore, it is used as the main material in the living spaces. Natural wood panels are superior in the balance of making it even more beneficial.

- **Wood Fibre 200mm**
  - External and internal insulation material made of fibre, which provides breathability to help mitigate moisture.

- **Stone Panels 20mm**
  - These panels are made out of the local stone, which contains high levels of moisture. The panels are manufactured with a waterjet cutter. They make the internal layer function as a thermal mass, keeping the building cool for a longer time.

- **Wood Fibre 100mm**
  - Lightweight and aesthetically pleasing, wood fibre provides an accessible finish. The insulation is manufactured with waterjet and routers. The wood fibre systems also provide a thermal mass, allowing the heat from the machinery to flow into the building.

- **Metal Sheet 3mm**
  - Metal sheet panels cover the exterior of the main building. They pass the load from the machinery to the main supports of the building.

- **Lamellar Wood Structure**
  - Wood fibres are used for the partition between the bedrooms. Its form and materiality provides acoustic absorption, as well as being lightweight and recyclable. Wood fibres are also used for the main structure, altering the heat from the machinery to flow into the building.

- **Wood Beams Structure**
  - Wood fibres are used for the partition between the bedrooms. Its form and materiality provides acoustic absorption, as well as being lightweight and recyclable. Wood fibres are also used for the main structure, altering the heat from the machinery to flow into the building.

- **Felt 5mm**
  - Used for the partition between the bedrooms. Its form and materiality provides acoustic absorption, as well as being lightweight and recyclable. Wood fibres are also used for the main structure, altering the heat from the machinery to flow into the building.

- **Aluminum Beams Structure**
  - The systems' main is located in the middle of the building, held on pillars. Therefore, it should have a strong, lightweight construction. Alumina is also used for the main structure, altering the heat from the machinery to flow into the building.

- **Layer 3**
  - R=46.52 U=0.13

- **Layer 4**
  - R=69.57 U=0.01

- **Layer 5**
  - R=69.57 U=0.01

- **Layer 6**
  - R=59.59 U=0.02

- **Layer 7**
  - R=24.03 U=0.04

- **Layer 8**
  - R=23.8 U=0.04
Performative Facade

The facade was designed according to wind pressure and velocity analysis. The parts that were closer to the points of maximal pressure were made smoother and more aerodynamic, while the panels where the wind was milder—e.g., 3.5 km/h. Thus, providing the facade with a rich texture that enhances the experience of the users.

Skin

Passive Heating

As part of the climatic strategy, the research station's shell acts as a greenhouse and is compartmentalised out of glass panels. Since glass is not resistant to harsh winds, in the high-pressure areas it was replaced with aluminium.
Between the outer and the first inner shell, the vehicles' area

Floor plan - level 0 (lobby)
Inside one of the bedrooms.

Floor plan - level 1 (researchers' residence)
The possibility for an adaptive architecture, meaning a design system capable of acting and reacting to its environment, always remained an obsession among experimental architects at all times. Despite this condition, most of the built environment is still conceived as fixed entities in a world of instabilities, what would be the formal and architectural definition of such an adaptive and formal structure capable of responding to an environment in constant transformation? Just as the animal adjust and adapt to its surrounding, the combination of contemporary building systems and responsive technologies are capable of creating such a condition of adaptation.

Plisse offers a combination of architectural and mechanical engineering apparatus that create a breathing, transforming, and moving architecture. A form of kinetic structure that is connected to its environment. The use of composite materials generates a lightweight structure. The project contains two levels. The first level contains hotel rooms and a laboratory, and the second level contains the researchers’ rooms. Every function in the project is located in a radial form to maintain the view towards the open opening and allowing the penetration of the sun. As the Israeli-Italian architect David Fisher wrote in his seminal work, “When I grew up and then became an architect, I understood that an architect should design buildings that adapt themselves to life, that adapt themselves to the spaces, the functionality and the needs that change continuously in our life.”
The C-5 Galaxy is a large military transport aircraft. It provides international range strategic airlift capability. The cargo compartment was 4.1 m wide by 3.6 m high and 37 m long. The skin is made of 16 folded plates which can be placed in the aircraft (along with the rest of the building's components).

The 16 plates are assembled by unfolding and connecting the small plates located at the bottom. Then, a PVC triangle is added to seal the gap.

The plates are connected by a simple hidden hinge. They are made of two thin structural carbon fiber plates on each side and have 10 layers of Spaceloft Aerogel (each layer is 6 mm thick) as thermal insulation.

Transportation & assembling

Hinge fold
Serve motor [pulley system]
In the center of the plates which form the floor there is a servo motor connected to 16 pulleys which are connected to cables that run through the main flanges. The motor releases/pulls the cables in order to expand the structure.

Sliding system
The floor is made of a main platform and 16 smaller plates located underneath which slide out while being pulled by the cables as a result of the servo motor movement.

Mechanical systems

Disconnecting from the skin
The entire structure is made of two main parts. One, the skin, which moves and can be adjusted to the environment. The other part contains all the vertical and horizontal elements.

Inserting natural light
During the winter the sun gets to a high point of 80 degrees Celsius at noon. This information influenced the opening of the skin, allowing it to be more open in the southern part, enabling the sun rays to enter the building and warm the rooms.

Reacting skin
SNOWSKIN
Lilach Shifrin & Sheer Han

Vernacular architecture in the Arctic was able to cope and utilize local climate and resources to its benefit. The construction was adapted to the wind, used aerodynamic morphology, and prevented the wind from penetrating the structure. Inspired by the wisdom of the local architecture, we designed a climate conscious research station. The research station includes a laboratory, living area, greenhouse, auditorium and observatory.

Nowadays in Schellenville, nature is a quiet, yet dramatic, presence. We believe architecture should let nature in thus creating an interaction with bioclimatic effects.

Our building corresponds with nature, the form follows the physical environment while the shell wraps itself with a snowy winter coat and blends into the surroundings.
Temperature Strategies

Chinese passive solar greenhouse

This greenhouse is an example of a passive structure that is adaptable to different climate conditions. A thick wall and partial roof on the north side act as a thermal mass to absorb solar energy during the day and release it back at night. An insulating blanket rolls down over the plastic at night to retain heat.

Research station

Inside the research station, the materials have thermal mass properties to keep the temperature balanced during the ongoing usage. The snow accumulation system functions as an extra insulating layer at the cold season. The greenhouse functions as a conservatory and a buffer to the core of the building, allowing to regulate the air between the spaces.

The shell is made of polycarbonate panels, with different transparency levels according to the results of a radiation analysis. The panels that are exposed to direct sunlight will be opaque polycarbonate and those that are exposed to indirect radiation will be transparent.

Radiation analysis

Site plan - Shafterville, Quebec, Canada
Floor plan - level 0

1. Residence
2. Kitchen
3. Bathroom
4. Greenhouse
5. Observatory
6. Laboratories
7. Auditorium

Floor plan - level 1

1. Residence
2. Kitchen
3. Bathroom
4. Greenhouse
5. Observatory
6. Laboratories
7. Auditorium
Insulating systems

A. Snow accumulation facade
- Polycarbonate 75 mm
- TIM - transparent insulation material 150 mm
- Elastomer ledge
- Snow accumulation cell

B. Snow melting system
- Hot water tubes
- Conductive beam
- Polycarbonate 75 mm

C. Icicle facade
- Polycarbonate 75 mm
- TIM - transparent insulation material 150 mm
- Stainless steel cable as Japanese gutter
- Icicles wall
O STATION
Ronald Odeh

O-station is located in Schefferville, an isolated town in the heart of the Innu territory that is not connected to the provincial road network but is accessible by airplane via the Schefferville Airport or by train.

The town experiences a subarctic climate. Schefferville has cool summers relative to its latitude and inland location. As the place is isolated from the outer world, and has few people, the O-station aims to increase and combine outer visitors to the area in order to expand the inner knowledge and culture of the Innu people. The interior space is shaped by a round design that provides connections between two floors, interior walls and tribunes.

The double skin of the station is composed of 24 similar panels of fiber glass and ETFE. It's advantage is that it is brought by O-1302 Mercure aircraft, and the pieces are applied in place. The panels move automatically tracking the season and sun, its purpose is to use the natural sunlight as much as possible, so there would be no need for artificial light to be used in the building. By detecting the season and sun, the fiber glass movement provides a better working atmosphere, by providing a reflected sunlight in the summer and allowing the direct sunlight in the winter season.
There are two levels in the station. The first one consists tourists' and researchers' bedrooms in order to enable a common experience of the place. In addition, there is a kitchen, a dining area, and an access to the library which is intended for both of these groups - tourists and researchers.

The second floor is intended to the research lab. By using the round shape with a double open space in the center it enables to keep a continuous communication between two stories and still provides a comfortable working atmosphere.

The panels are applied at the site one next to another as described in the diagram 4.
The exterior space of the station is described in previous page, works by using a round shape which consists out of 37 wood rings, one over the other (Diameter of 16 meters).

By pushing the wholering 32 cm towards night, this element provides a partition between lobby, bedrooms and lab (as described in diagram 5).

The station includes 6 bedrooms with different types. It varies between single, double and triple room. Bedrooms are located in the south area of the station to keep an access for the sun keeping the rooms heated. While the kitchen and library are located in the north, to prevent a direct access of sun that disturbs readers. The lab space provides 7 workspaces. It also has rest areas for the researchers. In addition, this floor has an access to the library that also connects the two floors.
The rotating complex is made of rotating pipe and servomotor. The servomotor is located at the rib profile of the structure, while the pipe exists in the fiberglass panel.

Each panel is made out of a rotating panel which are made of fiberglass. Each panel rotates according to the sun path in order to maximize heating in winter and provide natural sunlight at the whole entire open space. While in summer, sunlight is being reflected on the panels and penetrates as scattered light due to the high sun angle of 54 degrees.
ETFE is used to provide an insulated interior space of the time panels are in rotating mode. ETFE still provides access of light due to its transparency. The whole interior ETFE skin is made of parts that connected by ETFE profile FT. An customized profile fl (connecting between the ETFE structure and the fiberglass panels structure).
NORTHERN LIGHT
Itamar Rozenzaft & Amit Elam

Shape, material and light are not what architecture is made of. These raw materials can only be called architecture when men give them size and meaning.

It is not enough to design a place that one can stay in for a couple of days, its needed to mold meaning and content into a building and transform it from a structure that its essence is temporarily into architecture.

Alternately, to aim to a complete personalisation, we won’t arrive even a single person’s desires - for him is always ever changing.

One of the main issues we encountered during our visit in Schellenville is the incompatibility of the houses, which look like every American average house and the lifestyle of the residents. The native population set hunting and fishing trips multiple times during a year, sometime in a stormy weather.

Our project’s goal is to create a lightness that can be seen from a huge distance, it will be used as a rescue shelter as well as a research station for examination of animals, hunting patterns.

Using a new vermeulc architecture - analysis of immediate needs adjusted to the specific requirements of the sub-arctic and arctic weather while providing a solution, through new technologies and knowledge. The Northern Light will provide functional yet comfortable place for travelers to stay and live in a special atmosphere.

The building is energy efficient, able to collect and recycle water. The station is designed to be self-sustaining using wind turbines and solar panels. It can be constructed quickly and easily on site at any strategic spot. Reinforced fiberglass based technology of the outer shell is created at site, while the inner parts can be transport by snowmobiles.
MARS II
Sarah Amar Kreinin & Boris Levin

MARS II is located on Central Axel Heiberg Island, Nunavut, Canadian High Arctic (approximately 79°50'N, 104°40'W). This area is characterized by cold and dry Arctic climate conditions which makes the place extremely difficult to live in - the island is uninhabited except for the seasonal Mc-Gill Arctic Research Station (MARS) operated by McGill University.

The proposal represents a prototypical model capable of generating a symbolic space for living, working, and leisure. The objective of this project is to produce such a community both as a functional and experiential level as a response to the extreme climatic conditions of the site. The project suggests the possibility for a modular superstructure that functions as a hybrid of self-sufficient elements. These components aim to define multiple spatial orders capable of adapting to a universal context.

The structure is formed by two overlapping programmatic layers that define a spatial relation both internally and within the space itself. MARS II offers a unique condition by which multiple narratives act simultaneously instead of the conventional principles of zoning. Here, the architectural system is structured in a similar way as Aldo van Eyck's principle of interlocked clusters that define the circulation system and a shared experience. The continuous circulation streams along the building are accompanied with multifunctional open spaces with the objective of blurring the boundaries between collectiveness and individuality. In an effort to turn collaboration into action, its organization is defined by an inner topography that replaces inner partitions. This architectural strategy offers an interaction between technical and social aspects of architecture.

The remote geography of the site and the technical complexity of the building system call for a strategy in terms of self-sufficiency. Thus, the building skin is equipped with photovoltaic cells that follow a formal definition in order to maximize solar exposure and wind energy production. The resulting formal expression of the system shapes the architectural identity of MARS II.
Dominic Mountain, Axel Heberg Island, Nunavut, Canada

The project is placed at the foot of Dominic Mountain, near a small lake, which acts as a water source.
In an effort to create a universal system which can act in every climatic and environmental context, isolated from tough outer conditions, the hexagonal grid was chosen as a basis for project's demands.

This strategy allows to combine several systems and to use their interactions and overlaps in order to organize interlocked clusters.

Moreover, the modular principle of the elements' organization may be extremely useful for an installation on the site.

In order to avoid a situation in which the researches leave their families for a long period of time, the main concept includes two different facilities for both of these communities, which is represented in the scheme above.

The created structure allows to organize interactions and private niches in both spatial and social ways.

Inner division scheme
Program bubble diagram
Each unit can be designed and connected to another according to the unit’s position and function.

Every unit has three branches that can be connected to another or act as a unit’s ending. For every kind of situation, several solutions were designed.

In a connection between two units, there is a buffer space which allows to preserve the unit’s microclimate created according to the vegetation presence.

Also, we designed two options for a branch that is not a part of a unit-unit connection: a simple glass-screen ending attached to an inner public space and a wind turbine.
In an effort to turn collaboration into action, its organization is defined by an inner topography that replaces linear partitions. This architectural strategy offers an interaction between technical and social aspects of architecture creating a new quality of space and hiding the maintenance systems.
Traditional wind turbines capture only 59.3 percent of the energy in wind, a value called the Betz limit.

The design wind turbine blades are surrounded with a shroud that directs air through the blades and speeds it up, which increases power production. The new design generates as much power as a conventional wind turbine with blades twice as big in diameter. The smaller blade size and other factors allow the turbines to be packed closer together than conventional ones, increasing the amount of power that can be generated per acre of land.

1. Connector details
2. Turbine frame
3. Shroud
4. Stator
5. Power engine
6. Rotor

As air approaches, it first encounters the first set of blades, called the stand, which redirects it onto the second set of blades - the rotor. The air keeps the rotor and emerges on the other side of the rotor, moving more slowly now than the air flowing outside the turbine. The shroud is shaped so that it guides the relatively fast-moving air into the area just behind the rotor. The fast-moving air speeds up the slow-moving air, creating an area of low pressure behind the turbine blades that suctions more air through them.

"That is plausible that such a design could double or triple a turbine's power output," - Paul Schoen, professor of mechanical engineering at MIT.
SEPARATELY CONNECTED
Tom Tadmor & Roi Karni

A building can stand up by itself with minimal number of walls and doors. Though, we can still feel protected and get enough privacy we need. We believe that a massive network of cables and tubes can limit different spaces in a way and define private and public areas. It also can help us nothing where the floor starts and how high the top of the structure by identify the various infrastructures.

This way of thinking may give everyone an alternative for standard complexes which contain the essential needs for living and working and yet supplies amenities. These needs may include a place for sleeping, cooking and eating, getting shower, studying, working and leisure. In other words, we can design a bare structure which provides all the necessities of modern life.

We suggest a solution to develop the "Atmospheric Machine." The "Atmospheric Machine" may give people who visit the building a multiplicity of experiences. For instance, feeling of crowdedness, discomfort, peaceful or excitement. This solution is based on an efficient structural module. Each living space can be unique by its own cables, tubes and plumbing systems, so we can change the function of it by seeing and understanding the systems it requires. As a result, each one the structure's parts may create a different atmosphere.

This new architectural topology, which replaces walls with an infrastructure, brings together what used to be contradictory ways of life, of structure which may look related but still could be considered as a type of shelter.
Temperature diagram

Illumination diagram
INFINITE INFLATABLE CITY
Masha Poslyhalov & Raaza Dewirrat

"Mediate, do you know how much your house weighs?" is one of the most popular questions of American architect Buckminster Fuller that raises repercussions on how architecture can be implemented. Reiner Banham argues the differences between the archaic, massive and stiff architecture and the nomadic, light, Nauvoo one.

As weight directly influences flexibility, Infinite Inflatable City features a unique condition of lightweight. Flexible, light architecture generates a possibility for various lifestyle. The project is a prototypical model that expresses the possibility of a patriarchal system, from the housing unit to its formation into a large settlement. It shapes the environment in such a way that it can produce culture and growing communities by the fact that each unit is an individual part of a bigger network. The field of the project can easily be transformed and changed which imparts the external boundaries of the system.

The objective of RIC is to build a series of inflated geometrical domes capable of connecting to each other. The systems can be easily dismantled and relocated according to user's needs. The research station contains a greenhouse that analyzes hydroponic crops in the extreme environment of the Arctic while providing a home for the researchers.

PVC coated polyester elements inflated separately and connect with inflated structure. In addition, the modules of the material are providing three different range of translucent colors, which each one is located on the building's skin according to the interior function.

Banham R: "A Home is Not a House", 1965, p.76

Adjusted Global Studio - Schaffhausen, Canada 2017
Main principles

Bubble 1

Bubble 2

Bubble 3

The building is consisted of 3 shapes in which each one is composed of regular pentagons and regular hexagons.

Volume

\[ V_{\text{inflated}} = 188 \times 188 \text{ m}^2 \]
\[ V_{\text{inflated}} = 133 \times 133 \text{ m}^2 \]
\[ V_{\text{inflated}} = 177 \times 177 \text{ m}^2 \]

Mass

Bubble (Inflated structure & Cushions)

\[ M = 1126 + 43 \times 44 \]
\[ \text{Air} = \text{PVC} = 0.05 \text{ kg/m}^3 \]
\[ M_{\text{total}} = 1970 \text{ kg} \]

Benefits of Lightness

\[ V_{\text{direct}} = 184 \text{ m}^2 \]
\[ V_{\text{direct}} = 22 \text{ m}^2 \]

Growth Diagram

The City

Settlement

Case Study

The Core
Air supply device is provided for maintaining the pressure in the cushions. In addition to that, it is vital for ensuring that the air within the cushions is sufficiently dry. This prevents condensation and algae growth inside the cushions.

PVC coated polyester is a material frequently used for flexible fabric structures. It is made up of a polyester scrim, a bonding or adhesive agent, and an exterior PVC coating.

Building's skin consists of three layers: cushions, inflated structure, and pipe system. Cushions are connected to the inflated structure by tension clips.
Floor plan - level 0

1. Monitoring equipment
2. Greenhouse
3. Lab - washing and workspace
4. Equipment storage
5. Kitchen and Dining
6. Bedrooms
7. Storage
8. Bathrooms

Floor plan - level 1

1. Bedrooms
2. Leisure room
3. Greenhouse
4. Lab-Workspace
5. Meeting room
The inflated cushions which are made of PVC coated polyester are supported by an inflated structure. The inflated structure is stabilized by PVC water pipes. The water pipe and the inflated structure are connected by hot welding. Cushions are connected to the inflated structure. Building's systems are inserted within an independent structure inside the building that follows the path of the inflated structure.

Building systems are contained within one 10 cm diameter pipes that is located in the interior of the building. This pipe located consistently with the inflated structure system. The pipe includes the systems like, electricity, irrigation system, ventilation, gas and water.

Inflated structure is connected to the water PVC pipe by hot welding. The water pipe mass is bigger than the building's mass thus, it stabilizes the whole building.

During inflation, the cushion shape becomes rounded and begins to press on the inflated structure. Fixation surface between the cushions and the structure increases. Tension clips are applied to hold tight each cushion with near structure.

a. Is connected to the cushion through adhesive bonding;
b. Is connected to the structure through adhesive bonding.