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The influence of Periscope in the interior architecture and landscape Design

تأثير المنظار الفيزيائى فى تصميم العمارة الداخلية و تصميم المناظر الطبيعية

Submitted by

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لينا محمد حامد عيسى محمد سلمان

مصممة ديكور بوزارة الكهرباء و الطاقة المتجددة .. باحثة دكتوراه بكلية الفنون الجميلة جامعة الإسكندرية .. قسم ديكور ، شعبة عمارة داخلية

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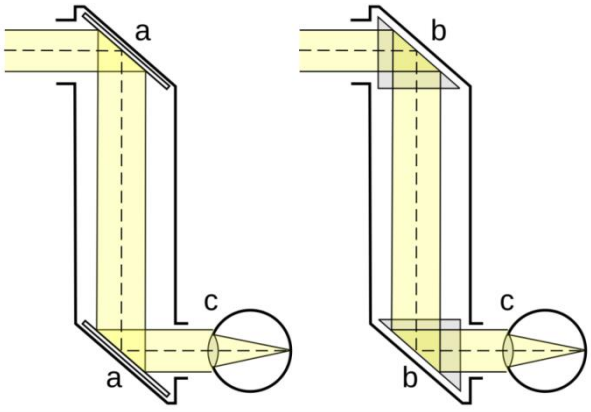
Abstract :-[1]

This paper discusses the concept of the periscope, and how it was effective in making the surrounded landscape part of the interior design indirectly... First, what is the ***Periscope?***
A periscope is an optical instrument that uses a system of prisms, lenses or mirrors to reflect images through a tube. Light from a distant object strikes the top mirror and is then reflected at an angle of 90 degrees down the periscope tube. At the bottom of the periscope, the light strikes another mirror and is then reflected into the viewer's eye. This simple periscope uses only flat mirrors as compared to the periscopes used on submarines, which are usually a complex optical system using both lenses and mirrors.
The periscope was influential in many fields; it used in land and sea warfare, submarine navigation, and elsewhere to enable an observer to see his surroundings while remaining under cover, behind armors, or submerged.
How the architects, interior designer & landscape designers get use of physics to develop their work and bring the landscape of the outside in

Principle of the periscope (shape 1)



(shape 1) The periscope on the left uses mirrors whereas the right uses prisms

[1] https://www.britannica.com/technology/periscope

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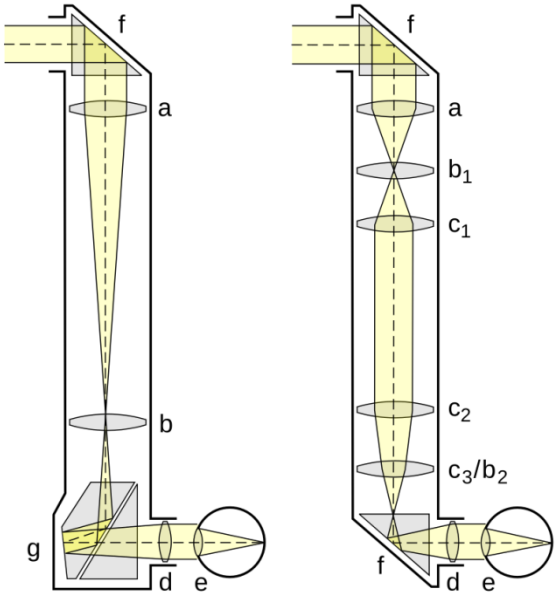
a) *Mirrors*
b) *Prisms*
c) *Observer's eye*

Principle of the lens periscope (shape 2)



(shape 2)The two periscopes differ in the way they erect the image, the left one uses an erecting prism whereas the right uses an erecting lens and a second image plane.

a) *Objective lens*
b) *Field lens*
c) *Image erecting lens*
d) *Ocular lens*
e) *Lens of the observer's eye*
f) *Right-angled prism*
g) *Image-erecting prism*

Key words:-
Physics, periscope, landscape design, closed spaces, view,

Research introduction:-

Physics greatly influenced other fields of science, When the basic elements of the general principles of physics are understood, it will move from the category of fundamental physics to be included under applied physics, until it later becomes part of technology. Thus, physical discoveries will turn into technical innovations in related fields, such as nuclear and biomedical engineering, quantum chemistry, quantum optics, and others.

This paper about how the quantum optics in periscope influenced architecture, interior architecture, landscape design.

Research problem:-

how to use the surrounded landscape as a major design element in interior design with keeping the privacy of the spaces.

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Research importance:-
to get use of the landscape in Egypt to the maximum with keeping the privacy as a middle eastern country .
Research objective:-
helping the designers to create a simple and variable interior design environment at a low cost, avoiding traditional ways in creating extraordinary landscape mixed with interior architecture, with maintaining the privacy of users.
research methodology:-
Descriptive approach, through studying each design elements individually, and how periscope was the major element in the design.

1. **periscope in interior architect :-**

1-1.periscope in public toilets:-

1-1-1.Public Toilet has a Periscope That Offers a Serene Sea view, Gdynia, Poland:-[2]

Shape (3) the public toilet on the other side of the street on Serene Sea shore

The terms "public toilet" and "seaside periscope" don't usually go hand in hand. However, the designer has drawn inspiration from the location of his project, on the coast of the Baltic Sea to create a concept for a building that both mimics and

[2] https://www.archdaily.com/537379/this-public-toilet-has-a-periscope-that-offers-a-serene-sea-view?ad_source=search&ad_medium=projects_tab

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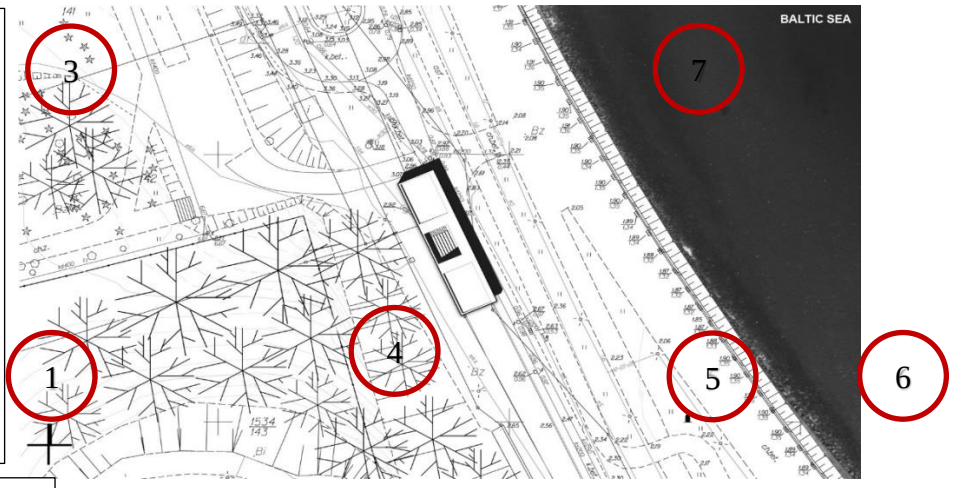
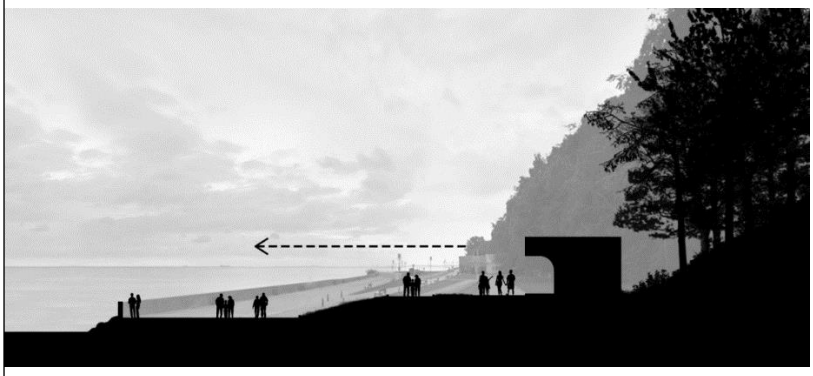
observes. Choosing to focus on extensive views over the sea front, he aimed to imbue users with a sense of tranquility by designing a serene public facility embodying the powerful, elemental nature of the sea.

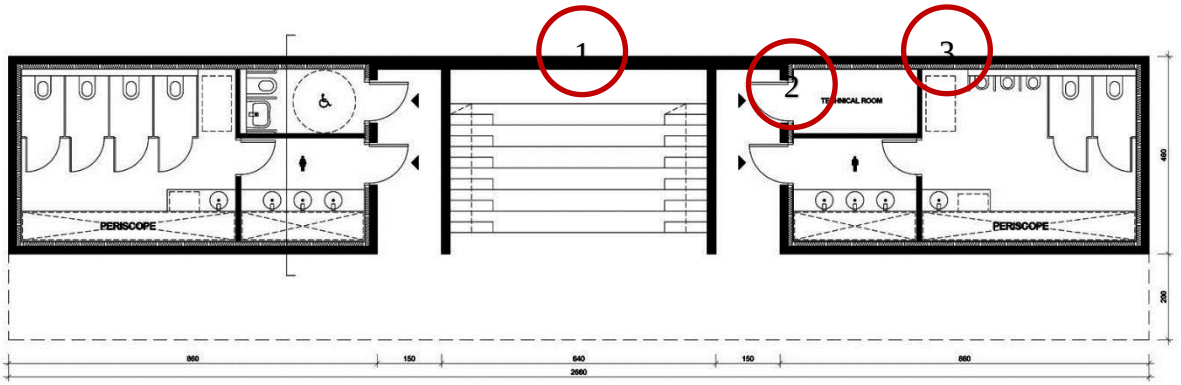
Shape (4) project site:-

1. The 90m2 public toilet .
2. The street between the toilet & the sea .
3. Sea shore.



Shape (5) shows the waterfront of the building, where the direction of the building's faces towards the sea. The upper part of the building is a periscope, and as will be discovered later, it is the design concept inside





shape (6) plan of the toilet

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1. On the left women's bathroom, this contains three adjacent basins next to the entrance, followed by the door leading to four adjacent toilet rooms, and a separate basin.

2. The periscope of women's bathroom, which is responsible for transferring the external view to the interior while maintaining the privacy of users.

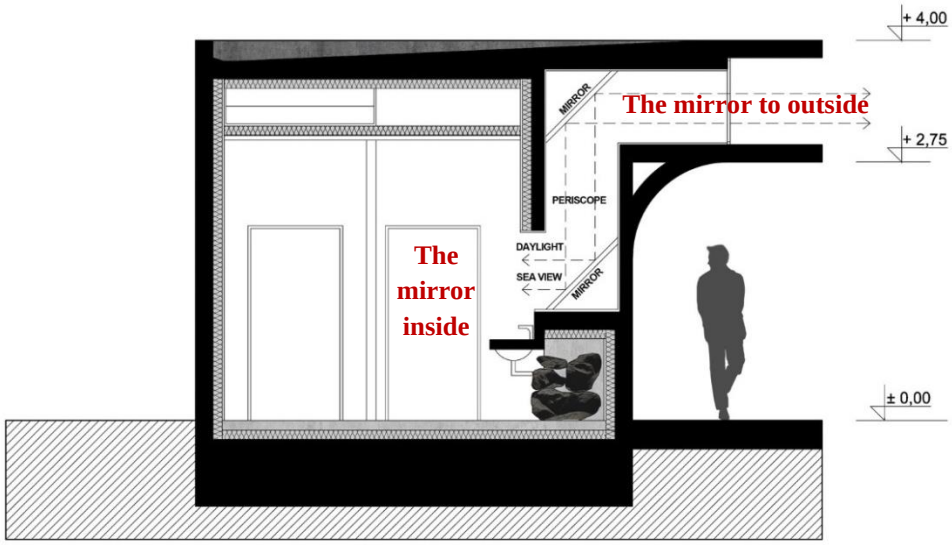
3. A shared bathroom for people with wheelchair which contains a private toilet and basin, located in a shared corridor with the women's bathroom.

4. In the middle, we find wooden steps used by passersby as a place to rest and watch the sea.

5. On the right men's bathroom, this contains three adjacent basins next to the entrance, followed by the door leading to two adjacent toilet rooms, three adjacent urinals and a separate basin.

6. The periscope of men's bathroom, which is responsible for transferring the external view to the interior while maintaining the privacy of the users.

7. Equipment room, contains the supplies for fixing & cleaning the bathroom .



Shape (7) Elevation shows the relationship between the periscope and the height of the building and how it works, as the upper external mirror is placed at a height of 4 meters above the ground, so the distance between them occupies 2.75 m2 and 4 m2,

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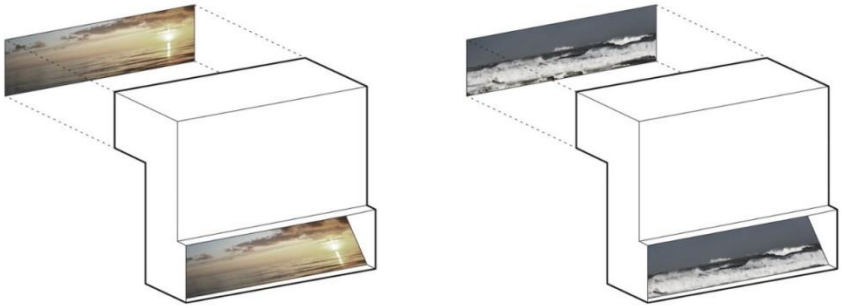
which is the total height of the building, which reflects sunlight inward onto the opposite mirror. This height was chosen to remove distracting view of cars, people and only reflects the shape of the sea and its lighting during the day and night.

Shape (8) shows the interior space while reflecting the sea & the sky at the morning

Shape (9) shows the interior space while reflecting the sea & the sky at the sunset



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Shape (10) How the view we want to transfer inside appears in the upper mirror and how it`s reflected in the lower mirror in the same way as a result of placing them together in two parallel directions. On the right we find the shape during the day... on the left we find the shape at sunset.

1-1-2. Periscope toilet scattered around the Ginkgo swan lake, china:-[3]

Toilet is the most private space. We hope that users could enjoy the time and space of their own even in a public toilet. It's an era of fragmented information and space. People can transport themselves between the private sphere and the public sphere through the virtual scene of the Internet Nevertheless, openness and privacy are often contradictory in real scenes. We want to resolve the contradiction between openness and privacy in the physical space: to go to the toilet along such a beautiful lake, people should be able to face the breeze and enjoy the beautiful scenery.

Shape (11) the architecture design of the toilets with the main concept design (periscope)

The floor plan of each toilet is a two meters wide square, within which the various components of the entire building, such as light steel structure, aluminum panels, ventilation shutters, rotating mirrors, and sanitary ware, can meet modular industrial production. Different heights of each periscope allow users in each toilet to have different views, meanwhile, group the modular units into an architecture landscape.

[3] https://www.archdaily.com/961468/periscope-toilet-hexia-architects

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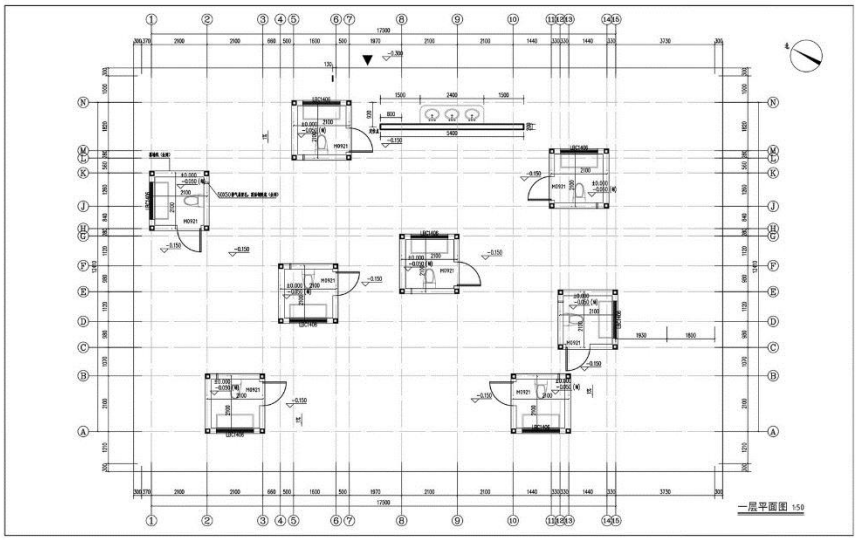
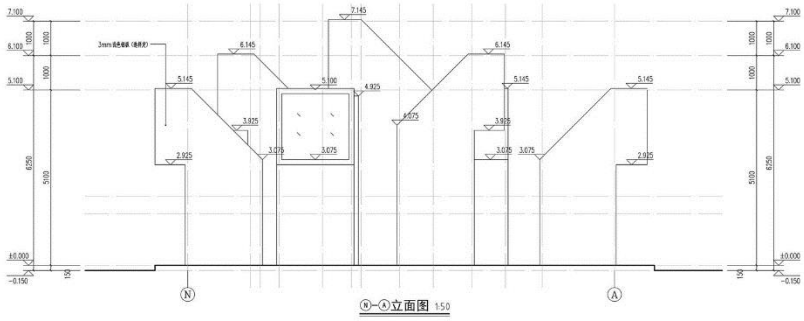
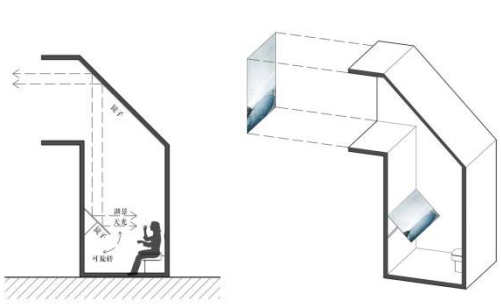


Shape (12) project plan with multiple periscope directions to make the view different in each toilet



Shape (13) side view that shows the non-symmetric design for the toilet rooms



Shape (14) how it looks to the user inside & how the views is scaled when moving the mirror inside in different angels

Shape (15) the mirrors in the front of users had ventilation opening in the back, so it could be used as a source of ventilation too

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1-2.periscope inresidential design:-

1-2-1.periscope house .. Girona,Spain:-[4]

The periscope house is a ruin rehabilitation of a protected village at the Alto Ampurdá, in Spain, to become a holiday residency.

Shape (16) An inhabitable roof lays on top of the recovered stone walls defining the volume and envelope of the house. In the interior the services are attached to the stone walls as a double skin to liberate the central space, which can be reconfigured in consonance with the different occupancies and uses desired: as a football field, night club or winter nest

[4] https://www.archdaily.com/237088/periscope-house-carquitectos?ad_source=search&ad_medium=projects_tab

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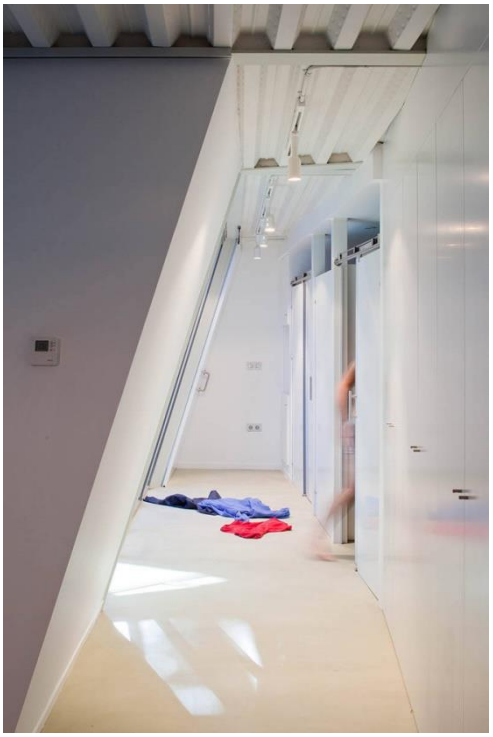

Shape (17) Two patios, whose geometry is shaped by sunlight and views, introduce light, ventilation and landscapes to the blind interior, becoming caleidoscopic domestic periscopes

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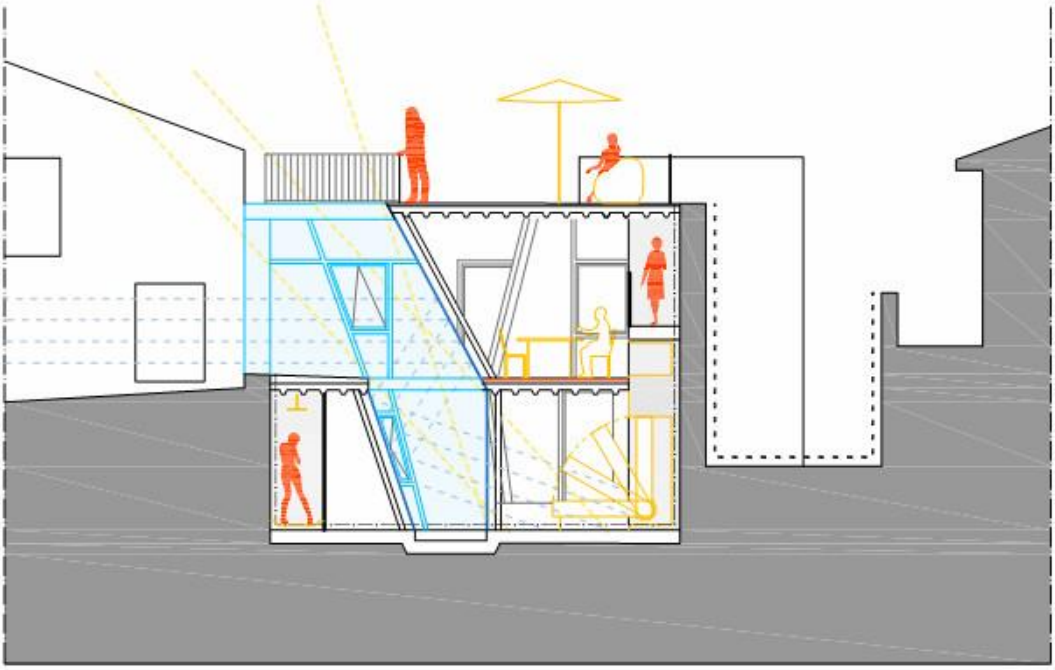
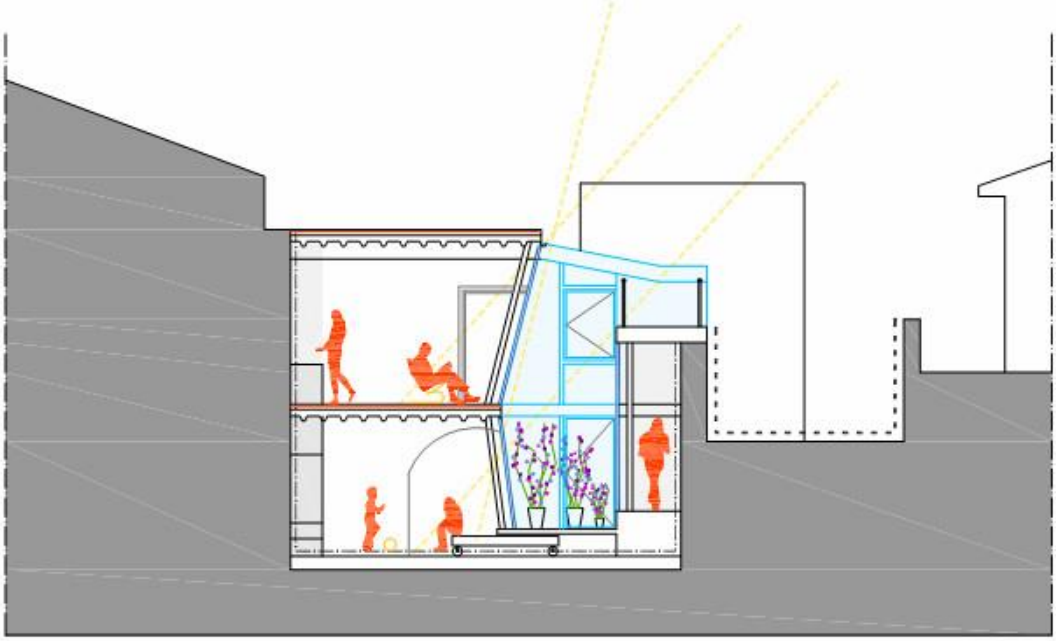


Section through Patio 1

Shape (18) patio 1 as we see periscope in this design works as a transporter for sunlight through different spaces up & down



Shape (19) patio 2 as we see periscope in this design works as a transporter for sunlight through different spaces up & down

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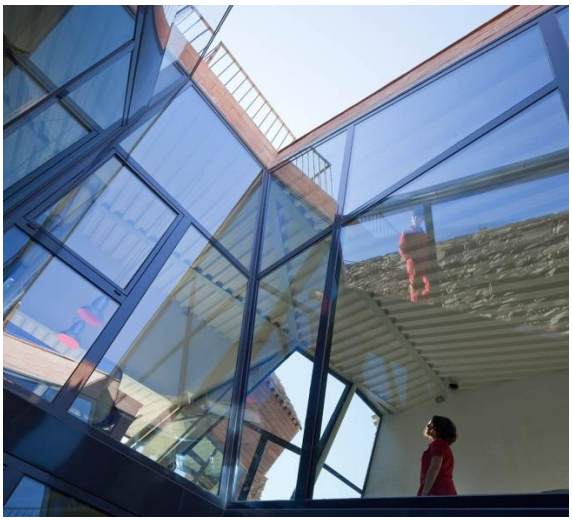
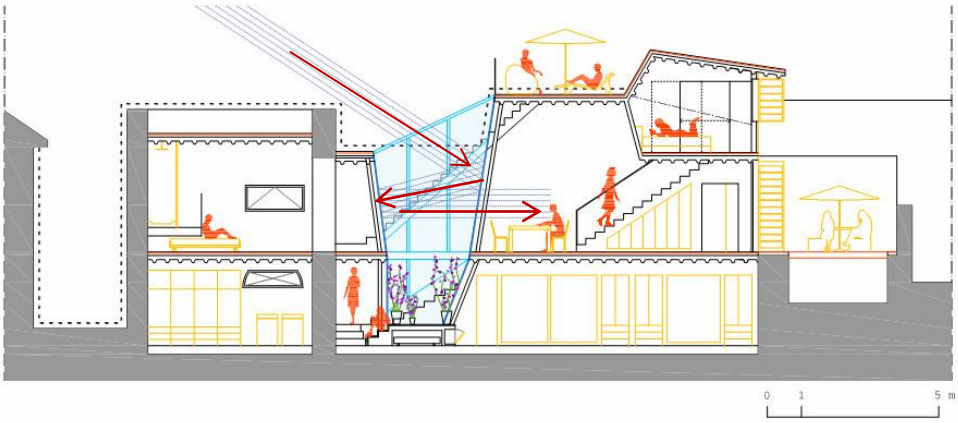
Shape (20) three scales of nature are then implemented: the microscopic of the mosses of the stone walls, the virtual of the landscape reflections in the mirror glass and the spectacular views of the surroundings that can be enjoyed at the roof





Shape (21) elevation of two patios, red arrows shows how the periscope with transparent glass as a source of natural day light through the floors in the building

The strategies that articulate the periscope house:-

1. The point of using the periscope in glass was merging technologies and landscapes, the geometry of the patios allows sunlight and ventilation control.

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2. At the same time captures exterior landscapes through reflections.

3. Then they become caleidoscopic devices that blur the relationship between the interior and the exterior of the house, producing situations in which one is simultaneously in the mountains, the trees and the sky.

4. Each corner is a micro space that can be activated, from another perspective; every strategy can be read in sustainable terms, as the heritage recuperation, the sunlight and ventilation passive control, the lack of excavation, the incorporation of renewable energies or the use of local materials and providers.

2. Periscope in landscape design:-

Myriad / CORD sculpture:-[5]The sculpture has been designed in collaboration by artist David Rickard and architect Germano Di Chello, in response to the brief for a sculpture that "offers a vantage point across the marshes at Snape and a new view over this at and beautiful landscape".

Shape (22) Standing tall on the Henry Moore Lawn, Myriad holds an array of mirrors high above visitors' heads reacting views of the surrounding landscape down to earth, Below several of the high level mirrors are further rector panels positioned to create a series of large periscopes.

[5] https://www.archdaily.com/790003/myriad-cord?ad_source=search&ad_medium=projects_tab

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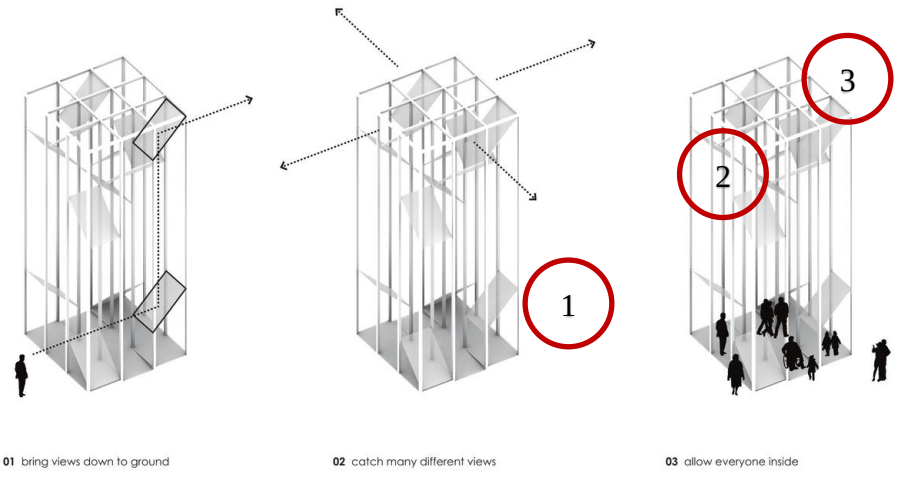
Shape (23) the view while standing under mirrors of the sculpture, reflecting different views for different directions for each mirror

Shape (24) project site:-

1. Music school which the sculpture designed for.
2. The sculpture between the lake and the building.
3. The lake.



Shape (25) prespective of how the design works as a landscape center peace:-

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1. Periscope mirrors: Bring views down to ground.
2. How mirror angels work: Catch many different views
3. The visitors: Allow everyone inside

Shape (26) made with brushed and mirror polished stainless steel, Myriad captures a wide and ever changing series of vistas from the spectacular surroundings, to create a dynamic multi-perspective collage that constantly shifts in relation to the visitors' movement around and within the sculpture.

3. Periscope in building renovations:-

3-1. Old Water and Observatory Tower in Prague:- [6]

Shape (27) The complex of the former waterworks on Letná has undergone several conversions since it was constructed in the second half of the 19th century but only the water tower has been preserved in its original form. The technical buildings, including the steam machine engine room, were demolished and replaced with multi-story annexes. In recent decades the complex has been used as a youth center and will retain this function once it has been renovated.

[6] https://www.archdaily.com/908203/old-water-and-observatory-tower-in-prague-petr-hajek-architekti?ad_source=search&ad_medium=projects_tab

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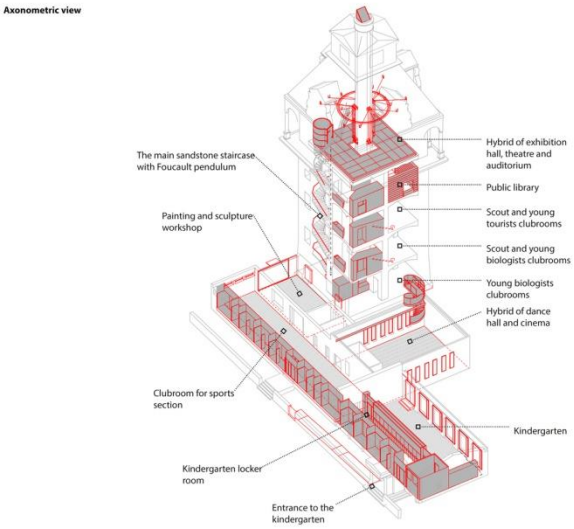

Shape (28) Axonometric view of the water tower after becoming youth Centre, it was originally the only local dominant point with a view of the city panorama, over time the surrounding land was developed and the tower gradually lost its view of the city, it was blinded; however, our proposed periscope has returned its “sight”, the chimney of the steam machine was used for pumping water to locate the periscope

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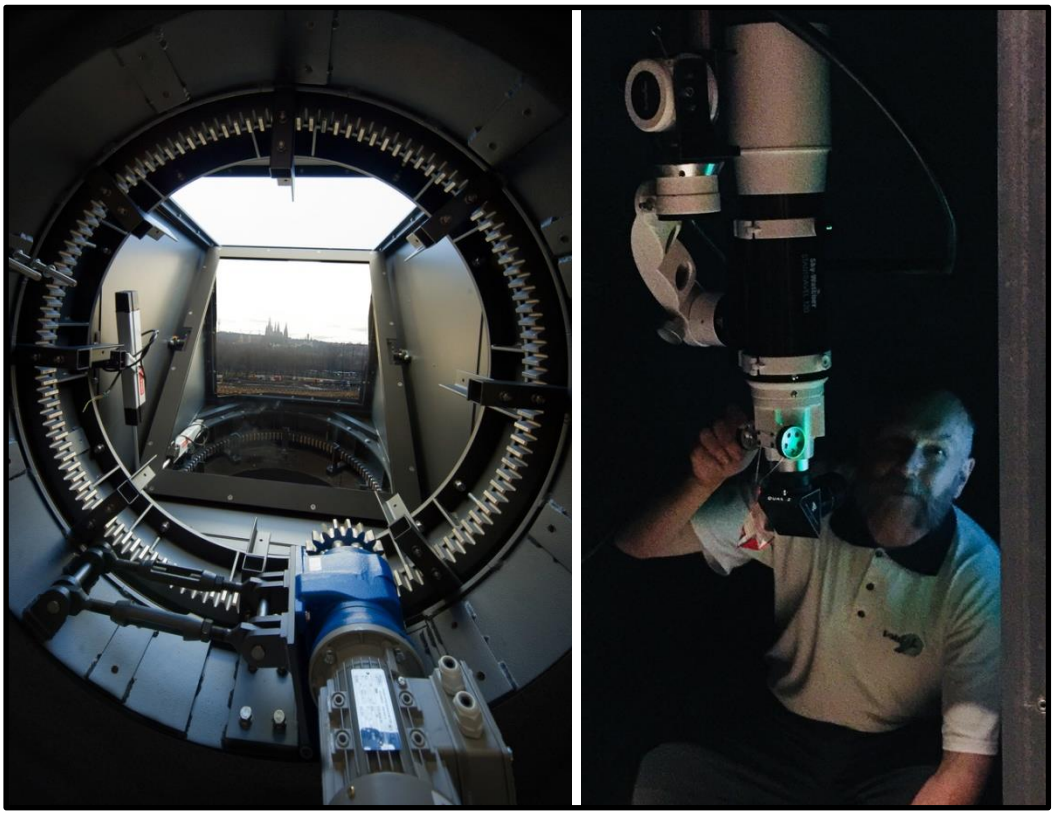
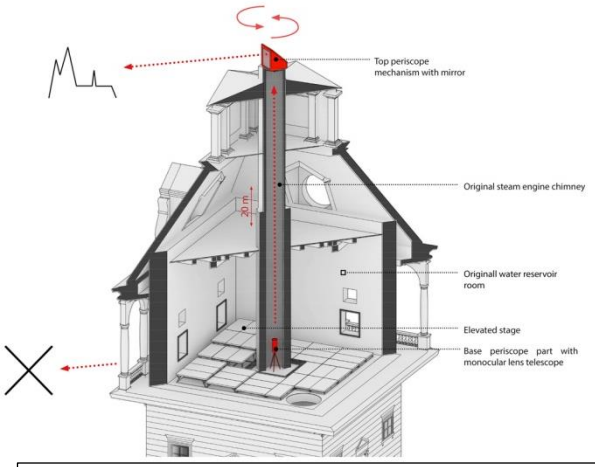


Shape (29) the evolution of the simple periscope to become telescopic periscope which mean we can observe not only the horizon and city panorama, but also objects in the night sky, such as the moon, the planets Mars, Jupiter, Saturn and many others, thanks to the powerful optics and electronic guidance system

Shape (31) the chimney after renovation in the periscope hall, 20 meters high from the base point to the view on top



Shape (30) sketch for the water tower from the inside during the transformation process to the room of the telescopic periscope, showing the view angel at the top of the building & the base point at the bottom of the chimney

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Shape (32) the building after finishing all the renovations showing how everyone could you the periscope individually with no help & what can the visitors see (mars, the moon) just by sitting in the old water tower

All the layers of history, from construction to the present, have been preserved during the modification works, the result is a structure that complexly presents the quality of the craftwork and details of various periods, you can find brush grained window from the 19th century next to doors from the nineteen-fifties, sixties and seventies. Aluminum windows from the 21st century, Bakelite, brass and steel window furniture, all composing a spatial architectural collage as it was created by time.

Results:-

1. Science and the arts are not separate as many believe, but rather integrated in distinctive and unusual ways, this integration helps in creating many wonderful designs in all art aspects.

2. Extraordinary designs don`t need a lot of money, or new smart objects to create fancy interior space, fancy could be found on the integration between the interior architecture & the surrounding landscape.

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3. Privacy isn`t the opposite of enjoying the space outside, we can do both.

4. Remodeling ancient buildings isn`t just about using it the way it is, it`s about adaptive reuse of the places to create new sprit with keeping its identity.

5. Periscope is one the most important elements in Interactive architecture.

Recommendations:-

1. Using the periscope in coastal cities is a must to take advantage of every single inch of the view.

2. Using the periscope in Middle Eastern countries as conservative society will help people to keep in touch with the nature they live in.

3. We mustn`t ignore classic physics for smart technology or AI, we can mix them to get simple telescopic periscope.