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Theme:

**The "Domespace " intelligent and sustainable house for
more natural lighting, sunshine and view outside.**

The project:

Touristic village

Examiner's committee

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Dedication:

With all my love, I dedicate this work to those who walked beside me with their hearts and support.

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Summary :

This thesis explores how sustainable architecture can be combined with smart design to improve the use of natural lighting and connection with outdoor views. It focuses on the concept of the Domespace , a wooden dome-shaped house known for being eco-friendly. Its rotating mechanism allows it to follow or avoid the sun and make the most of surrounding views.

The study begins with a theoretical analysis of the Domespace: its concept, history, and features that provide indoor comfort. It highlights how the Domespace design helps increase access to daylight and offers beautiful panoramic views, which contribute to human well-being and user satisfaction.

To fully understand the components of this concept, the research includes a study of design standards for natural lighting and outdoor view quality. It also examines different examples of rotating houses to understand the rotation mechanism.

Finally, the aim of this work is to propose an eco-tourist village that uses Domespace units as guest accommodations. These units are designed with a rotation system that allows them to follow or avoid the sun and adjust room orientation based on the surrounding landscape. The goal is to create a unique and comfortable tourism experience that respects the environment and promotes sustainability and smart design in architecture.

Keywords:

Domespace, Sustainable architecture, Natural lighting, Sunshine, view outside , Rotating house, Visual comfort, Bioclimatic design, Eco-tourism, Intelligent design .

المخلص :

تستكشف هذه الأطروحة كيفية دمج العمارة المستدامة مع التصميم الذكي لتحسين استخدام الإضاءة الطبيعية والتواصل مع المناظر الخارجية. وترتكز على مفهوم " (Domespace) "، وهو منزل خشبي على شكل قبة، يُعرف بصداقته للبيئة. تتيح آلية دورانه إمكانية تتبع الشمس أو تجنبها، والاستفادة القصوى من المناظر المحيطة.

تبدأ الدراسة بتحليل نظري للقبة: مفهومها وتاريخها وميزاتها التي توفر الراحة الداخلية. كما تُسلط الضوء على كيفية مساهمة تصميمها في زيادة الوصول إلى ضوء النهار، وتوفير مناظر بانورامية خلابة، مما يُسهم في رفاهية الإنسان ورضا المستخدمين.

ولفهم مكونات هذا المفهوم بشكل كامل، يتضمن البحث دراسة معايير التصميم للإضاءة الطبيعية وجودة المناظر الخارجية. كما يتناول أمثلة مختلفة للمنازل الدوارة لفهم آلية الدوران.

وأخيراً، يهدف هذا العمل إلى اقتراح قرية سياحية بيئية تستخدم وحدات "القبة" كأماكن إقامة للضيوف. صُممت هذه الوحدات بنظام دوران يسمح لها بتتبع الشمس أو تجنبها، وتعديل اتجاه الغرف بناءً على المناظر الطبيعية المحيطة. الهدف هو خلق تجربة سياحية فريدة ومريحة، تحترم البيئة وتعزز الاستدامة والتصميم الذكي في العمارة.

الكلمات المفتاحية:

مساحة القبة، العمارة المستدامة، الإضاءة الطبيعية، أشعة الشمس، المنظر الخارجي، المنزل الدوار، الراحة البصرية، التصميم المناخي الحيوي، السياحة البيئية، التصميم الذكي.

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Introductory Chapter

II.1 General Introduction :

In the face of growing environmental challenges and climate change, sustainable architecture has become a primary goal for a better and more comfortable life. This has led to numerous innovations, including rotating houses, which rely on smart technologies that allow them to rotate and track the sun's movement. This significantly improves energy efficiency. By maximizing solar gain in winter and avoiding it in summer, these houses contribute to reducing reliance on traditional energy sources, thereby alleviating environmental pressures. Especially after the world has faced problems such as declining energy resources, increased carbon dioxide emissions, and rising energy costs, the concept of rotating buildings aims to solve these problems by controlling heat gain and loss throughout the seasons, thereby improving building efficiency and contributing to a more sustainable future. (Çağlar, 2005)

In addition to being sustainable and environmentally friendly, these rotating buildings also encourage the use of natural lighting in interior spaces. This is an excellent way to reduce energy costs and save energy, and it also has health and psychological benefits. The literature shows a growing interest in these benefits, and one of the greatest advantages of natural light is its dynamic nature. Through changes in the intensity and radiation of natural light throughout the day and year, it leads to changes in weather and climate and aligns with the human body's biological clock, affecting daily functions. (SFAKSI Imen , 2023) (Hellinga & H, 2013)

Additionally, the constantly changing external views provided by these buildings, ranging from breathtaking natural landscapes to vibrant urban scenes, play a vital role in enhancing the psychological well-being of occupants. The continuous rotation of the building ensures a rich and renewed visual experience, reducing boredom and increasing awareness of the surrounding environment. Previous studies have confirmed that external views have a significant impact on the mental health and well-being of building occupants. Studies have also shown that the quality of views has economic significance, as hotels and luxury apartments that offer panoramic views of the city or nature enjoy higher demand and achieve higher prices. (Hellinga & H, 2013) (ko woon he & al, Window View Quality: Why It Matters and What We, 2022)

Ultimately, the design and development of rotating homes enhances natural lighting and maximizes the use of outdoor views. Creating a dynamic interaction between the two generates a unique and constantly changing living experience. These homes can pave the way for a more sustainable future with lower energy consumption and a more evolved relationship between humans and nature. However, they pose significant challenges, particularly in engineering and design. Overcoming these challenges requires a multidisciplinary collaboration to push the boundaries of design and technology .

II.2 Problematic :

Achieving a balance between environmental responsibility and human comfort is a significant challenge, especially in light of environmental issues such as climate change, diminishing energy resources, and rising energy costs. Sustainable architecture has emerged as a solution to address these challenges. Among the most innovative concepts in this field are rotating houses, which incorporate sustainable and intelligent solutions, prioritizing natural lighting, sunlight, and scenic views. These factors contribute to addressing the urgent need for living environments that are more human-centered and environmentally responsible.

However, challenges remain in understanding how to balance the integration of natural lighting and outdoor views with energy efficiency and environmental sustainability. Additionally, the implementation of rotating houses presents a major challenge in terms of engineering complexities and requires a multidisciplinary approach to integrate advanced technology with sustainable design principles.

This leads to several critical questions:

- What variables influence the daylight quality in indoor spaces?
- What variables influence the view quality in indoor spaces?

- How can a building like Domespace be designed to optimize sunlight, embrace natural views, and enhance the tourist experience, while overcoming related engineering and design challenges through innovative solutions?

II.3 Hypothesis :

The questions posed in this study prompted the formulation of hypotheses, seeking innovative solutions for integrating rotating building designs to optimize daylight, sunlight, and views while enhancing sustainability and user comfort. The aim is to achieve a comprehensive approach to architectural innovation, effectively addressing challenges in dynamic environmental adaptation.

- Buildings designed to rotate with the sun's path, incorporating advanced technologies and materials, can maximize natural daylight usage, improve thermal comfort, and reduce energy consumption, creating a more sustainable and adaptive architectural solution.
- Rotating buildings designed to independently orient themselves for optimal views rather than sun tracking can enhance the occupants' connection with the surrounding environment while balancing daylight exposure and visual comfort, thus redefining architectural experiences in both residential and touristic contexts.

II.4 Objectives :

The primary objective of this study is to explore how sustainable and smart architectural concepts, particularly rotating houses, can be applied to enhance natural lighting, optimize outdoor views, and improve energy efficiency within the context of a tourist village.

The study specifically aims to:

1. Identify and analyze the factors that influence the quality of daylight and outdoor views.
2. Address the technical and economic challenges associated with implementing rotating buildings and propose practical, viable strategies.
3. Propose innovative architectural designs that maximize daylight penetration and enhance the integration of natural landscapes through rotating house concepts.

Ultimately, this research seeks to demonstrate how integrating rotating houses into a tourist village can create a distinctive blend of sustainability, innovation, and enhanced user experience.

II.5 Research methodology :

In this research, a comprehensive methodological approach was adopted, utilizing literature reviews, case studies, and site analyses to thoroughly explore the themes of sustainable and intelligent architectural design. The study aims to address the posed research questions by integrating theoretical concepts, practical applications, and innovative design strategies focused on daylight, sunlight, and view quality, with a particular emphasis on rotating building technologies.

The research is structured into five main chapters:

Introductory Chapter:

This chapter will provide a general introduction, clearly outlining the research problem, the hypothesis, and the objectives.

Theoretical Chapter:

This section will be divided into two parts:

- The first part will focus on the rotating house (Domespace) , its key features, and its relationship with the environment.
- The second part will explore the variables influencing daylight and view quality in architectural spaces .

Methodologique Chapter :

In this chapter, we will focus on the rotation systems of various rotating buildings and how they operate, along with the principles related to natural lighting and external views.

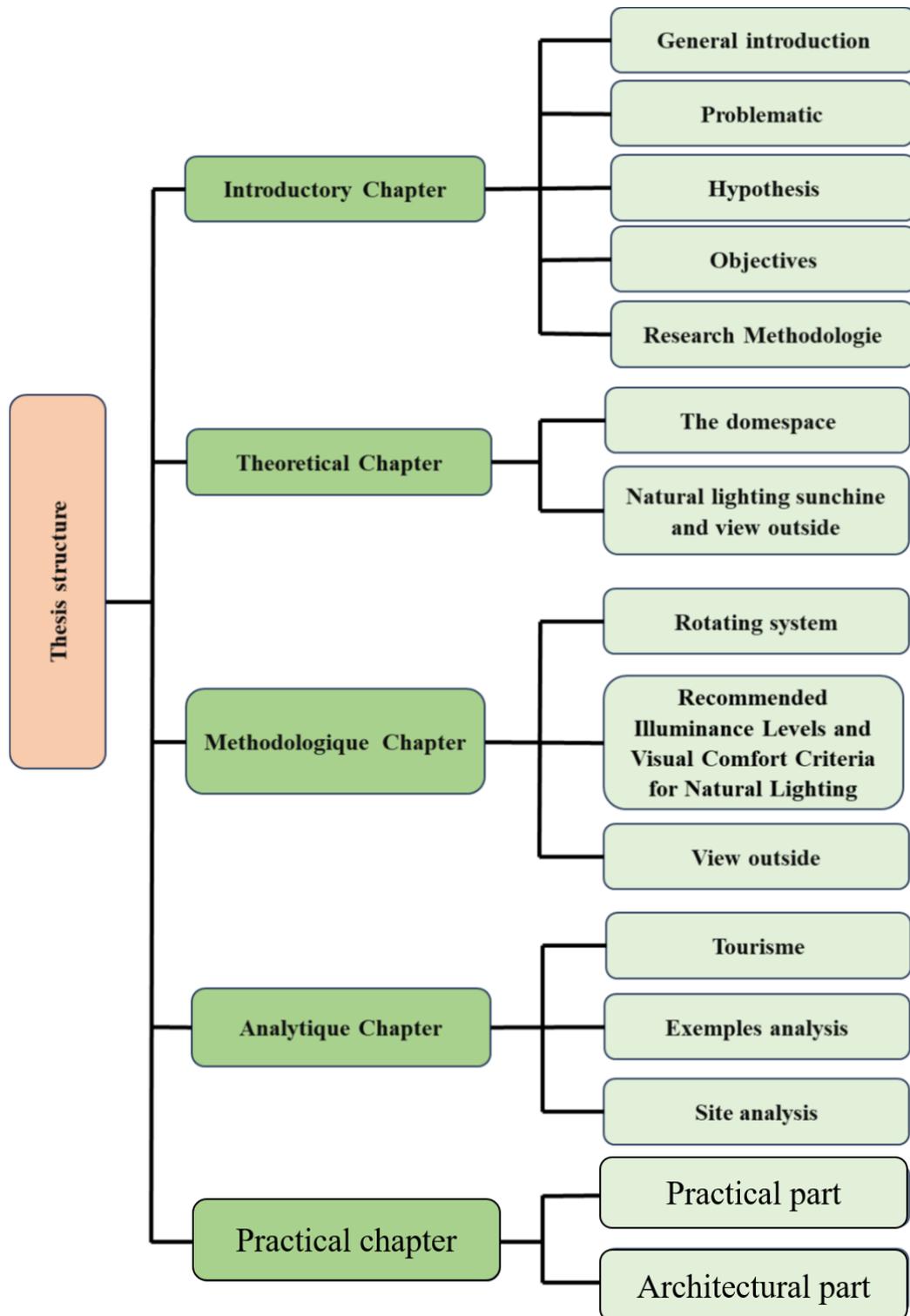
Analytical Chapter:

This chapter will analyze case studies, to evaluate their design strategies, functional aspects, and environmental performance. A detailed analysis of the site conditions, including climatic parameters and natural features .

Architectural Chapter:

This chapter is divided into two main sections: a practical section and an architectural section. This part will detail the proposed design, including its program, concept development, and innovative features.

II.6 Thesis structure :



Theoretical Chapter

III.1 Introduction :

Daylight and outdoor views are important elements in architectural design, as daylight is considered more comfortable and attractive than artificial lighting and has the ability to reduce energy demand in buildings (e.g. Bodart & Deneyer, 2004; Dietrich, 2006). Views outside also affect the comfort of a building, and it is clear that many factors influence both, such as window size, materials, building orientation, and view quality. Furthermore, innovative building designs, like the Domespace, demonstrate how architectural features can be adapted to effectively harness sunlight while providing panoramic views. This chapter aims to explore Domespace and their characteristics and to investigate the changes and factors that affect natural lighting and outdoor views.

III.2 The dome space :

III.2.1 Definition of domespace :

A domespace is a unique concept, modern, eco-friendly and rotating house, that uses solar energy for heating and cooling; as it is in line with the sun's rays for heating in the winter and in the summer it rotates against the sun's rays direction for cooling. The circular shape of the house offers panoramic views and optimal natural light distribution. Constructed primarily from wood, Domespace homes prioritize sustainability and energy efficiency.



Figure 1 : Domespace

Source : (Muller Immobilier, s.d., p. GALERIE PHOTOS)

III.2.2 History of Domespace and Partnership with Muller Immobilier :

The story of Domespace begins in 1988 with Patrick Marsilli, a passionate advocate for organic architecture. He developed the concept of dome houses, highlighting their advantages in terms of resistance and cost. Marsilli also incorporated the golden ratio into his designs, creating spaces that were both aesthetically pleasing and harmonious.

From the 1980s, Marsilli was aware of the environmental impact of traditional construction. He therefore directed his research towards more ecological and energy-efficient materials and solutions. Over the years, Domespace evolved and gained popularity, with projects carried out in several countries.

In parallel, Alain Muller, a Swiss wood expert, developed a real estate business focused on sustainability. In 2022, the two men met and decided to join forces. Muller, convinced of Domespace's potential to meet current energy challenges, obtained the exclusive license to market these houses in French-speaking Switzerland.

This partnership marks a turning point for Domespace. It combines Marsilli's innovative vision with Muller's expertise in sustainable construction. Together, they offer housing solutions that are environmentally friendly and meet the expectations of Swiss homeowners. (Muller Immobilier, s.d., p. Un peu d'histoire)

III.2.3 Environmental Aspects of Domespace:

III.2.3.1 Energy efficiency :

-Domespace homes achieve the highest energy efficiency rating (CECB AAA).

- They minimize energy consumption and CO2 emissions.
- Solar Impulse Label (Immobilier, n.d.)

III.2.3.2 Elimination of Concrete :

- The absence of concrete with a high carbon footprint to ensure no emissions are generated during construction. (Immobilier, n.d.)

III.2.3.3 Zero CO₂ Emissions :

- By using sustainable materials, the dome house is designed to meet Switzerland's 2025 goals of achieving zero CO2 emissions. (Immobilier, n.d.)

III.2.4 Respect for the Environment :

III.2.4.1 Rotational Design :

- The house rotates 320 degrees allowing it to follow the sun to warm in winter and avoid it in summer to provide comfort . (Immobilier, n.d.)

III.2.4.2 Use of Sustainable Materials :

- Domespace homes use sustainable wood, acting as a carbon sink.
- Wood is durable, resistant to decay, and requires no chemical treatments . (Immobilier, n.d.)



Figure 3 : Domespace
Source : (Muller Immobilier, s.d., p. GALERIE PHOTOS)



Figure 2 : Domespace
Source : (Muller Immobilier, s.d., p. GALERIE PHOTOS)

III.2.4.3 Antisismique et anticyclonique :

- Domespace homes are designed to withstand natural disasters like earthquakes and storms.
- Their rounded shape and flexible construction provide natural resistance . (Immobilier, n.d.)

III.2.4.4 Recognition by Solar Impulse Foundation :

- Awarded the “Solar Impulse Efficient Solution” label, the design exemplifies the integration of clean technologies to tackle environmental challenges (Immobilier, n.d.)

III.2.5 Comfort and Indoor Environment :

III.2.5.1 Change visual orientation:

- It allows for a panoramic view and changing views at will anytime and anywhere (Çağlar, 2005);

III.2.5.2 Aesthetic and Functional Design :

- By incorporating the golden ratio into the house construction, a natural aesthetic is created in it (Immobilier, n.d.) . Additionally, the spherical shape and natural materials used in it create an appealing and relaxing living area. (Çağlar, 2005)



Figure 5 : domespace , Indoor Environment
Source : (Muller Immobilier, s.d., p. GALERIE PHOTOS)

Figure 4 : domespace , Indoor Environment
Source : (Muller Immobilier, s.d., p. GALERIE PHOTOS)

III.2.5.3 Thermal comfort:

- The home rotation system promotes exposure to natural light and regulates heat in all seasons ensuring thermal comfort . (Çağlar, 2005)

III.2.5.4 Healthy indoor air quality:

- Allows the use of natural and non-toxic substances (wood) in a healthier construction . (Immobilier, n.d.)

" the motor is small because it takes very little energy to rotate the house since we're on huge ball bearing we can even rotate it by hand " Patrick Marsili

" The technical challenge is related to the rotating load bearing model. The structure is self-supporting and rests on a 3 metre ball bearing, so you can have 200 or 600 m² floating above 16 m². " Benjamin Thoby , technical director .

III.2.6 Construction and Structural Details:

III.2.6.1 Primary Structure:

- Foundation : The Domespace is built on a reinforced concrete base, which anchors the structure securely to the ground.
- the use of "mixed wood-aluminum frames "for windows and structural elements.
- Roof covering is specified as "red cedar wood strips", contributing to natural aesthetics .

III.2.7 Windows and Openings:

III.2.7.1 Panoramic Windows:

- The dome features large, curved, and strategically positioned panoramic windows, extending across the dome’s surface. These windows:
- Maximize natural light penetration, Provide uninterrupted 360-degree views, allowing residents to enjoy the surrounding landscapes from any angle.

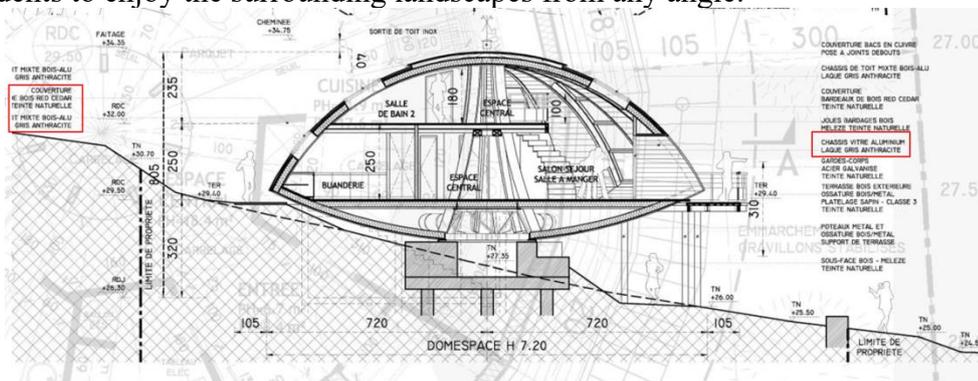


Figure 6 : Domespace section with details .
Source : [2016 - HABITATION J Domespace | Ordre des architectes](#)

III.3 Natural lighting , sunshine , view outside :

III.3.1 Naturel lighting , sunchine :

III.3.1.1 Naturel lighting Difinition :

- It is a physical phenomenon that results from the distribution of natural light in the building by penetrating the casing and reflecting light on the building's constituent materials (KABA Imen, 2012). The technique of inserting natural light inside the building is done through the exterior glass (windows, skylights, etc.) (Naser Hussain Khairi , 2021). It is more efficient, fun and economic . (Reiter & Sigrid, 2004)

III.3.1.2 sunchine Difinition :

- Sunlight has a profound impact on human , its existence, and enhances its daily activities. An important factor for well-being in the built environment is the requirement to take precautions to avoid visual or thermal discomfort . (E.Ne'eman & Wendy Light, 1976)

III.3.1.3 Natural lighting , sunchine and health :

- natural lighting can have a positive influence on the health of people through three different systems:

III.3.1.3.1 Visual system :

- The way we perceive our environment is linked to the extreme presence of natural light (SFAKSI Imen , 2023).

III.3.1.3.2Circadian system :

- Natural light is essential in regulating our circadian rhythm, which in turn is necessary for stimulating blood circulation, thus affecting human metabolism and controlling many hormones (N. Shishegar & M. Boubekri, 2016-05-21) , natural Light is the primary regulator of neurohormone melatoninthat governs our sleep-wake cycle (Van Den Wymelenberg & Kevin, 2014) (AKINBAMI, 2024) (AKINBAMI, 2024) .

III.3.1.3.3Skin system:

- Natural light interacts beneficially with the skin through the process of photosynthesis, stimulating the production of vitamin D, which in turn facilitates calcium absorption and strengthens bones. (N. Shishegar & M. Boubekri, 2016-05-21)

Physically		Psychologically	
Improve	Decrease	Improve	Decrease
Vitamin D	Cancer Possibility	Mood	Depression
Visual System	Abnormal Bone Formation	Mental Performance	Stress
Circadian Rhythms	-	Alertness	Sadness
Sleep Quality	-	Brain activity	Violent Behavior

Table 1 : Natural light and humain body
Source : (N. Shishegar & M. Boubekri, 2016-05-21)

III.4 View outside :

III.4.1 Difinition :

- A view from inside a building that looks out onto the surrounding area, typically through windows or other openings . (SFAKSI Imen , 2023)

III.4.2 The variables composing the view outside :

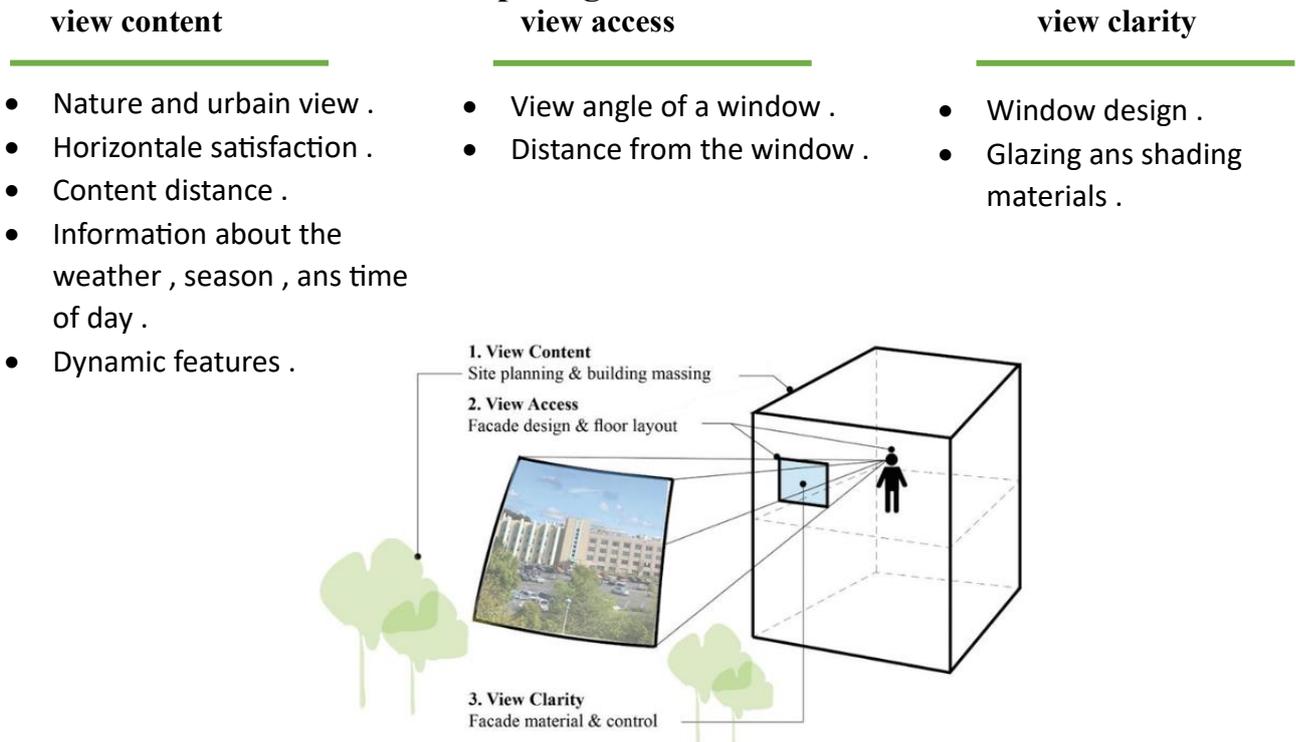


Figure 7 : The primary variables for driving view quality: content, access, and clarity.
 Source : (ko woon he & al, Window View Quality: Why It Matters and What We, 2022)

III.4.2.1 View content :

- content is the sum of the visual features that are seen in the window view (ko woon he & al, A window view quality assessment framework, 2021) . Preferred views often connect occupants to nature, three horizontal layers , distant elements , and movement .

- **Nature and urban features :**

- Views with nature, especially those with greenery and water, are preferred for their positive impact on psychological well-being. Natural elements, such as trees and water bodies, can significantly enhance the value of a building, particularly in residential settings. While urban views can also be desirable , especially those with landmarks , natural views are generally preferred . (ko woon he & al, Window View Quality: Why It Matters and What We, 2022)



Figure 8 : The different types of content of the view to the outside: A: natural view; B: urban view; C: combined view
 Source : [Pinterest](#) consulted on: 07/11/2024

- Horizontal stratification :

-Horizontal stratification refers to the clear division of a view into distinct layers, such as ground, landscape, and sky . (Markus & Thomas A, 1967)



Figure 9 : The horizontal layers of a view from the window: A: ground layer; B: landscape layer ; C: sky layer

Source : [Pinterest](#) consulted on: 07/11/2024

- Content distance :

- While distant views are generally preferred, this only holds for primarily urban content. When preferred visual elements (like nature) are present, distance has a much weaker influence . (SFAKSI Imen , 2023)

- Information about the weather, season, and time of day :

- People prefer to see outdoor views because it gives them information about the weather and time; natural elements such as sky and greenery are also valuable because they express the seasons. (Hellinga & H, 2013)

- Dynamic features :

- Dynamic elements can make a scene more engaging and exciting. Watching people go about their daily lives or seeing the changing seasons can evoke positive emotions and make a person feel connected to the world around them. But too much activity can cause distraction and stress. (ko woon he & al, 2022)

III.4.2.2 view access :

- View access quantifies how much of a window view is visible from a specific location within a space. (ko woon he & al, A window view quality assessment framework, 2021)

- View angle of a window :

- The viewing angle is determined by the distance between the person and the window and plays an important role in visual perception. Recommended viewing angles vary and research indicates that the horizontal angle considered appropriate is usually no less than 14 degrees. (SFAKSI Imen , 2023)

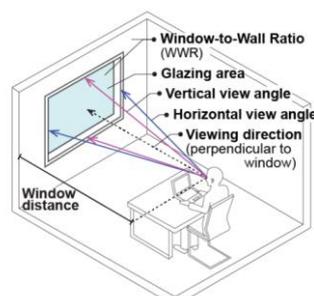


Figure 10 : Variables of view access
Source : (Ko Won Hee & al, 2023)

- **Distance from the window :**
- The distance between the seating place and the window has a crucial role in determining the quality of access to vision. Where sitting away from the window is often less visible and obscured which negatively affects their satisfaction and on the other hand may also suffer from sitting near the window discomfort due to glare or high temperature . (SFAKSI Imen , 2023)

III.4.2.3 View clarity :

- Clarity refers to the visual clarity of a window view, influenced by factors like glazing quality, shading, and external conditions. (ko woon he & al, 2022)
- **Window design :**
- The design of window frames can significantly impact how a view is perceived. The shape and proportion of these frames can affect the visibility of the external elements and the satisfaction of the occupants of the building . (ko woon he & al, A window view quality assessment framework, 2021)



Figure 11 : (A) ground, landscape, and sky layers and without mullions, the same window view but with hypothetical (B) vertical and (C) horizontal mullions.

Source : [Pinterest](#) consulted on: 07/11/2024

- **Glazing and shading materials :**
- The clarity of a view can be affected by the type of glass used. While most modern glasses have high visible transmittance, tinted or coated glasses can alter the perceived color and contrast of the view

III.5 Conclusion :

In conclusion, it can be said that the design of the Domespace is an innovative and unique solution to enhance natural lighting and outdoor views in buildings. It allows for dynamic adjustments that maximize sunlight while providing panoramic views of the landscape , thus creating a harmonious balance between the interior and exterior environments.

Moreover, both natural lighting and outdoor views are essential elements in design, playing a significant role in the well-being and energy efficiency of building occupants. Daylight has the ability to reduce energy demand in buildings by decreasing the need for electric lighting, while the quality of outdoor views enhances the connection with the environment, positively affecting the comfort and well-being of the building's occupants.

Methodologique chapter

IV.1 Introduction :

This chapter explores innovative methodologies for sustainable and intelligent housing designs, focusing on three distinct aspects: the rotating house system, recommended illuminance levels and visual comfort criteria for natural lighting, and view quality and quantity analysis.

Initially, the rotating house system was analyzed through several examples, such as Domespace, Johnstone’s Rotating House, and Suite Vollard. Subsequently, lighting levels were studied to ensure optimal natural lighting for visual comfort. Finally, factors influencing the quality and quantity of views were examined.

Through the study of these areas, the chapter provides a comprehensive understanding of rotating building designs that integrate environmental performance and occupant well-being.

IV.2 Rotating system :

IV.2.1 Domespace :

- The dome house is designed to be oriented by constructing it on a central axis.
- The entire house is mounted on a massive metal ring, which houses the rotation motor. The wooden structure is attached to this ring, causing the whole house to revolve as the ring turn .
- The interior layout is organized around a central axis, which houses utilities such as plumbing, electrical systems, and the rotation motor.



Figure 12 : a central axis
Source : (Domespace Developments, s.d.)

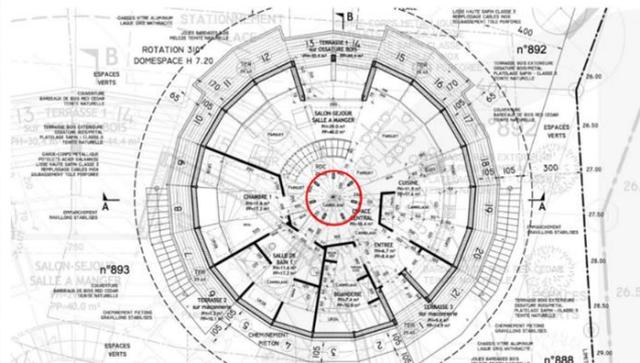


Figure 13 : a central axis
Source : [2016 - HABITATION J Domespace | Ordre des architectes](#)

" the motor is small because it takes very little energy to rotate the house since we're on huge ball bearing we can even rotate it by hand " Patrick Marsili
 " The technical challenge is related to the rotating load bearing model. The structure is self-supporting and rests on a 3 metre ball bearing, so you can have 200 or 600 m² floating above 16 m². " Benjamin Thoby , technical director .



Figure 15 : a massive metal ring
Source : www.youtube.com/watch?v=9pwGJ_XtXoo



Figure 14 : Motor
Source : www.youtube.com/watch?v=9pwGJ_XtXoo

IV.2.2 Two ways to rotate the house:

IV.2.2.1 Remotely with a remote control:

- By pressing the button the house starts to rotate gently right or left.

IV.2.2.2 Automatically with a computer:

- By programming the computer to follow the sun throughout the day or move away from it, or put itself in a specific position at a specific time. (Domespace : la maison ronde en bois et qui tourne !, 2024)

IV.2.3 Johnstone's Rotating House :

- The Johnson family posed two interrelated challenges in designing the house:
 1. how to exploit the site's panoramic views .
 2. how to make the most of the small site .
- Al Johnston envisioned that a large circular upper floor could be built above the small basement so that the sizes would fit together. He said: "And if you're going to have a round structure," "why not make it rotate to have every view? (RANDAL, 2008)



Figure 17 : Johnstone's Rotating House
Source : (RANDAL, 2008)



Figure 16 : Johnstone's Rotating House
Source : (RANDAL, 2008)

IV.2.3.1 How It Rotates :

- the second floor, weighing 600,000 pounds, rotating atop a stationary first floor .
- The rotation is supported by 40, 8" bearings, a central main bearing, and drive wheels, offering a combined load capacity of 3,664,000 pounds.
- A 1.5-horsepower DC motor powers the rotation, requiring only 0.8 horsepower to start and 0.75 horsepower to run the house in either direction anywhere from one revolution in 33 minutes up to one revolution in 24 hours, it can rotate in either direction as many times as one would want (it doesn't have to unwind).
- The motor drives the drive wheels through a 1564 to 1 dual worm gear transmission - very smoothly. (Johnstone, 2024)
- "The most significant way for what Johnstone calls the "swivel-a central connection device located at the bottom of the main column that links fixed pipes and wiring from the ground to those aboard the rotating superstructure. " (RANDAL, 2008)



Figure 18 : Construction details of Johnstone's Rotating House
Source : (Johnstone, 2024)

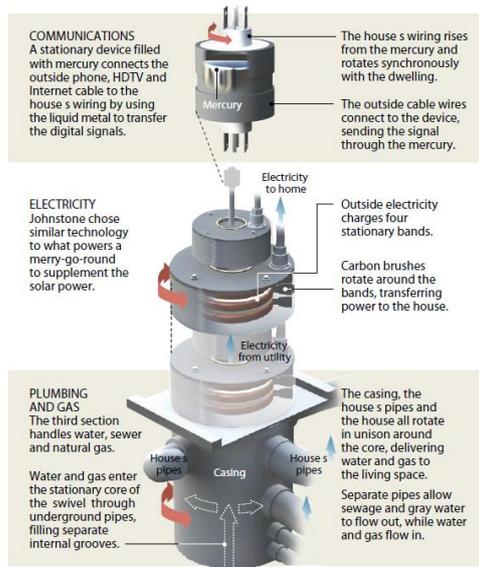


Figure 20 : swivel-a central
Source : (The D*Haus Company Ltd, August 2017)



Figure 19 : details of Johnstone's Rotating House
Source : (The D*Haus Company Ltd, August 2017)

IV.2.4 The Suite Vollard , Brazil :

- It is considered the first fully rotating residential building, as it has a cylindrical shape with a rectangular block attached to it on one side. (Fouad, 2012) It consists of 15 floors , The first two floors of the building are an Executive Center. The rest of the floors are residential apartments. Each floor can rotate independently, clockwise or counterclockwise, controlled by the apartment owner with a button. A full rotation takes approximately one hour. (statesman house delhi, 2024)

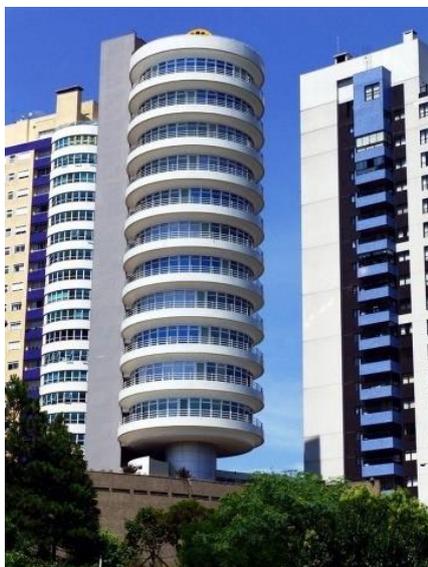


Figure 21 : The suit vollard
Source : Pinterest consulted on: 08/12/2024



Figure 22 : Plan of individual appartement
Source : (statesman house delhi, 2024)

- Each floor rotates around the stationary core that hosts all plumbing, electricity and HVAC connections. The rectilinear block where stairs and elevator are located is static same as the center core . (Fouad, 2012)
- A 958 ft² metal platform was laterally structured with vertical metal struts attached to its base and connected to a curved guide fixed to a concrete slab. The platform rotates using a system of cogwheels and roller chains, powered by independent engines for each unit, controlled via remote. A full 360° rotation takes one hour and can be scheduled with a timer. The system's load limit for optimal performance is 150 kgf/m², or 13 tons. (statesman house delhi, 2024)



Figure 24 : Framework of rotating platform over concrete slab
Source : (statesman house delhi, 2024)

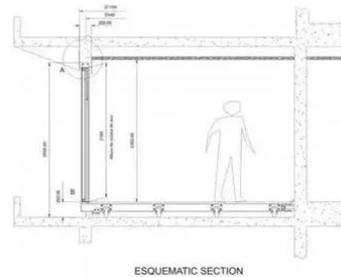


Figure 23 : Section
Source : (statesman house delhi, 2024)

IV.2.5 Rotating House Based On Heliotropism

In the context of researching the mechanics of making houses rotate, a study (An Experimental Study on Rotating House Based On Heliotropism) refers to the principle of heliotropism, which relies on adjusting the building's orientation to optimally align with the movement of the sun. In this study, precise calculations were used to determine how the building should rotate. Therefore, this section will rely on and analyze the results found in this article : (Indumathi.M, 2017)

IV.2.5.1 Thrust Ball Bearing Calculations :

The total weight of the building is determined and a safety factor is added to ensure that the bearings are able to support the load as the house rotates. These calculations ensure that the design is safe and reduces the risk of failure or collapse during operation.

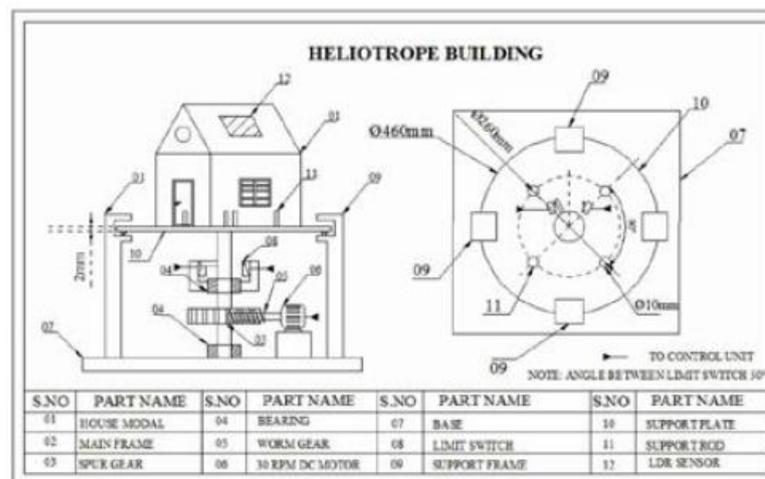


Figure 25 : Details of Heliotrope building
Source : (Indumathi.M, 2017)

Inputs:

1. Total weight of the building and mechanical setup:
 - Building weight: 78 tons.
 - Mechanical setup weight: 10 tons.
 - Total weight = 78+10=8878 + 10 = 8878+10=88 tons.
2. Safety factor:
 - Half of the total weight is added as a safety factor.
 - Total weight with safety factor = 88 tons+44 tons=132 tons
3. Number of distribution points:
 - The weight is distributed across 5 points during rotation.
 - Weight per point = 132 tons / 5=32.5 tons/point
4. Equation used for axial load (F am) calculation:
 - The equation: $F_{am} = A(n/1000)^2$

- Here, A represents a constant factor depending on the design and material properties, and n is the required axial load.

Calculations:

Estimating the axial load using the provided value:

- The value of AAA is a fixed constant based on the design.
- Using the given values in the calculations:
 - $F_{am}=200,000 \text{ N}$.

Results:

- Calculated axial load per point is 200,000 Newtons.
- This load is greater than the minimum required, ensuring that the design is safe and structurally stable during the building's rotation.

IV.3 Recommended Illuminance Levels and Visual Comfort Criteria for Natural Lighting :

Illuminance levels play a crucial role in determining the visual comfort and functionality of indoor spaces, particularly when relying on natural lighting. Table 3 summarizes the relationship between illuminance levels and visual comfort, while Table 4 presents the recommended illuminance levels for various room types as outlined by the Illuminating Engineering Society of North America (IESNA). These benchmarks provide valuable insights for designing spaces that optimize natural lighting to meet user needs effectively.

Average illuminance areas in%	Indications in the visual comfort scales
% < 150 lux	Insufficient
150 lux < % < 550 lux	Adequate
550 lux < % < 950 lux	Desirable
% > 950 lux	Uncomfortable

Table 2 : Summary table of average illuminance areas in (%) for each month , hour .
Source : (Toufik Mezerdi, Mostefa Medouki, & Imene Sfaksi, 2022)

Room type	Recommended illuminance level
Bedroom	200-300 Lux
Kitchen	300-750 Lux
Living room	100-200 Lux
Corridor	100-200 Lux

Table 3 : Recommended illuminance levels from IESNA
Source : (Toufik Mezerdi, Mostefa Medouki, & Imene Sfaksi, 2022)

IV.4 View outside :

IV.4.1 The View Quality Index :

In previous works and literature, a visual quality index has been proposed to evaluate the quality of a view based on three variables: View Content , view access , view clarity . This index integrates these variables to provide a comprehensive assessment and is calculated as follows: (ko woon he & al, A window view quality assessment framework, 2021)

IV.4.1.1 View Content :

The calculation involves assessing the presence of different layers in the view (sky, landscape, ground, nature) and assigning weights to these features based on their distance and dynamic characteristics.

$$V_{\text{content}} = L_{\text{sky}} + L_{\text{landscape}} \cdot Wf_{\text{ct.dis}} + L_{\text{ground}} \cdot Wf_{\text{movement}} + L_{\text{nature}} \cdot Wf_{\text{ct.dis}}$$

With ↓

① $Wf_{\text{ct.dis}}$

=

- 1.00 → if 50 m < content distance
- 0.75 → if 20 m < content distance ≤ 50 m
- 0.50 → if 06 m < content distance ≤ 20 m
- 0.00 → if content distance ≥ 6 m

② Wf_{movement}

=

- 1.00 → if Distant dynamic feature(s) > 6 m is present
- 0.50 → if No dynamic feature(s) ≥ 6 m is present
- 0.00 → if Nearby dynamic feature(s) ≥ 6 m is present

③ $Wf_{\text{ct.dis}}$

=

- 1.00 → if % of natural features in the scene > 50 %
- 0.75 → if 25 % ≥ % of natural features in the scene ≥ 50 %
- 0.50 → if % of natural features in the scene ≥ 25 %
- 0.00 → if no natural features in the scene

④

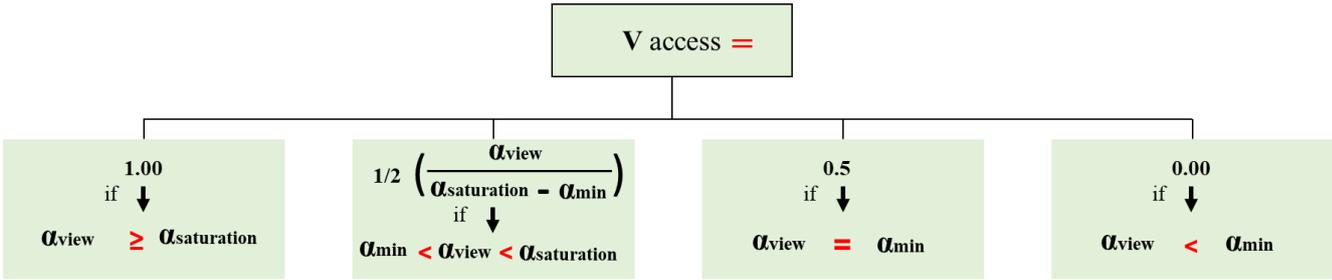
$L_{\text{sky}}, L_{\text{landscape}}, L_{\text{ground}}, L_{\text{nature}} = \begin{cases} 0.25 & \text{if Present in the scene} \\ 0.00 & \text{if Absent in the scene} \end{cases}$

L_x represent horizontal layers (sky , landscape , ground) and nature present in the view
 Wf represent weighting factor

Figure 26 : View content calculation
 Source : (ko woon he & al, A window view quality assessment framework, 2021)

IV.4.1.2 View Access :

Represents the view angle scores that can be derived from the *View content*

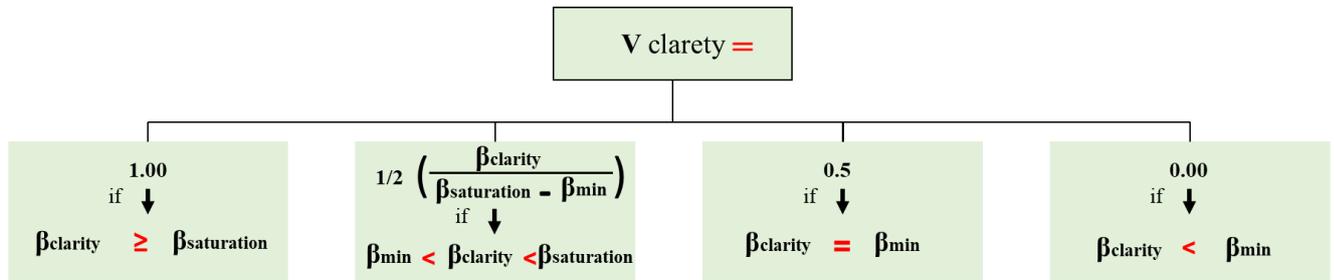


α_{view} : The view angle from the occupant's perspective.
 α_{min} : Minimum acceptable view angle.
 $\alpha_{\text{saturation}}$: Maximum view angle where no further improvement in access is perceived.

Figure 27 : View access calculation
 Source : (ko woon he & al, A window view quality assessment framework, 2021)

IV.4.1.3 View Clarity :

represents the view clarity scores based on the VCI



$\beta_{clarity}$: Clarity score based on the visual properties of the window.

β_{min} : Minimum clarity threshold.

$\beta_{saturation}$: Maximum clarity level.

Figure 28 : View clarity calculation
Source : (ko woon he & al, A window view quality assessment framework, 2021)

IV.4.2 VQI Calculation:

The final VQI is calculated by multiplying the three variables:

$$VQI = V_{content} \cdot V_{access} \cdot V_{clarity}$$

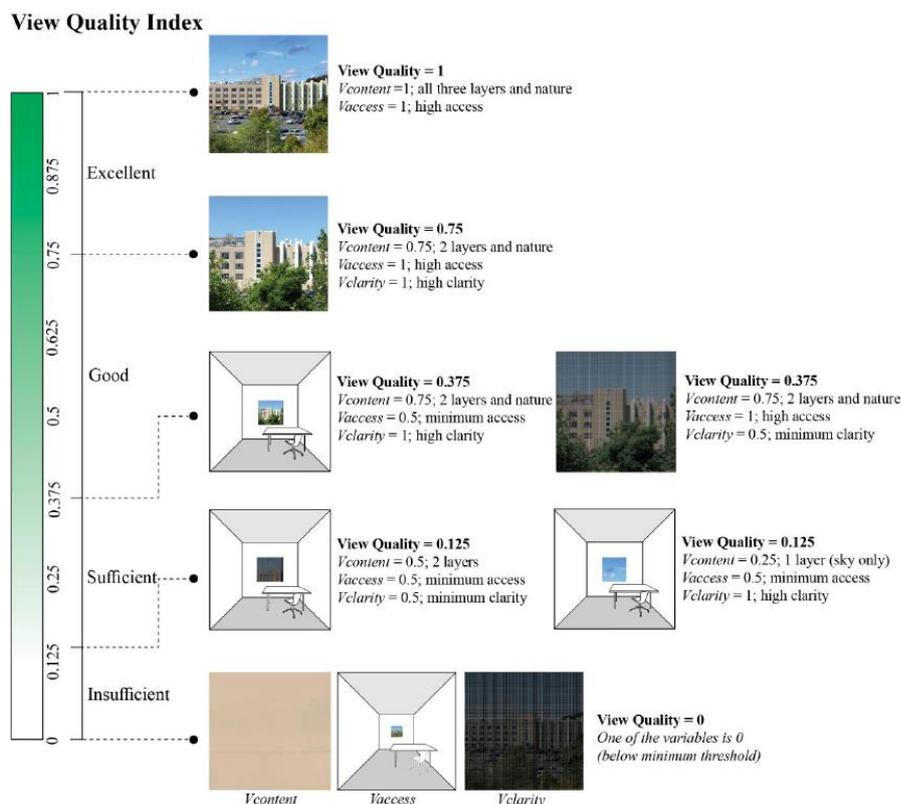


Figure 29 : Conceptual calculations of view quality.
Source : (ko woon he & al, A window view quality assessment framework, 2021)

IV.4.3 The quantity of view :

IV.4.3.1 View Factor :

View factor is an assessment of the visual quality of a scene, considering both content and viewing angle. The viewing angle is calculated by taking the smaller angle between the vertical and horizontal angles. Subsequently, the visual elements within the scene are evaluated to determine the final scene factor level, ranging from 1 (lowest) to 5 (highest). (ko woon he & al, A window view quality assessment framework, 2021)

View Factor	View angle (°)	Description	Compliant
5	50 to 90	Completely filled the visual field of the observer seated at the workstation	
4 or 5	40 to 50	4 (non-nature view) or 5 (nature view)	
4	20 to 40	Filled about one-half of the visual field	Yes
3 or 4	15 to 20	3 (non-nature view) or 4 (nature view)	
3	11 to 15	Filled about one-half of view factor 4, but still with a coherent view	
2 or 3	9 to 11	2 (non-nature view) or 3 (nature view)	Yes/No
2	11 to 15	A narrow and typically fractured view	
1 or 2	4 to 11	1 (non-nature view) or 2 (nature view)	No
1	1 to 4	A glimpse of sky or sliver of the outside environment	

Table 4 : View factor calculation based on the view angle and content (Heschong , Mahon Group , 2003)
 Source : (ko woon he & al, A window view quality assessment framework, 2021)

IV.4.3.2 Distance from a window :

The distance between the spaces and the window significantly impacts access to outdoor views. in green building certifications, this distance is considered in their guidelines:

- BREEAM specifies that relevant building areas should be within 8 meters of an external wall with a window.
- LEED v4.1 requires unobstructed views located within a distance equivalent to three times the window's height .

IV.4.3.3 window-to-wall ratio :

The average WWRs for all building categories and sub-types are presented in Table . Also presented are the ‘minimum WWR’ and ‘maximum WWR’ as these numbers provide insight into the variation of the WWR across different façade faces. (Grace Sze-en Foo & Daniel Shen, 2018)

Building Category & Sub-Type	Sample count	Average WWR of all samples in category	Minimum WWR in category	Maximum WWR in category
		<i>Calculated by taking the overall average across the WWR for each building.</i>	<i>Calculated by taking the overall average across the lowest WWR for each building</i>	<i>Calculated by taking the overall average across the highest WWR for each building.</i>
Office	28	46%	31%	61%
Low rise office (<10 floors)	15	35%	18%	54%
Mid Rise office (10-25 floors)	8	63%	53%	70%
High Rise office (25+ floors)	5	57%	41%	69%
Aged Care	30	27%	15%	41%
Retail	27	30%	10%	52%
Outdoor Strip Retail	8	50%	13%	59%
Shopping Centre	5	28%	10%	45%
Standalone retail	14	18%	9%	51%
Hospitals	25	30%	14%	45%
Education	29	32%	11%	49%
ELC	3	26%	11%	46%
Primary school	7	24%	3%	44%
Secondary School	7	25%	7%	43%
University	12	44%	26%	58%
Hotels	26	27%	12%	40%
Business Hotel	18	32%	15%	47%
Motel	8	16%	5%	29%

Table 5 : WWR across different building sub-types
 Source : (Grace Sze-en Foo & Daniel Shen, 2018)

IV.5 Conclusion :

The methodologies presented in this chapter offer valuable tools for assessing the sustainability and functionality of the buildings designs. They provide insights into how to design rotating homes that can optimize solar orientation and landscape views. Moreover, the inclusion of lighting criteria ensures visual comfort, and the evaluation of the quality and quantity of views underscores the importance of external visual connections in enhancing the comfort and well-being of occupants.

Analytique Chapter

V.1 Introduction :

This chapter delves into an analytical framework for exploring the three key aspects of our project (Domespace, Natural lighting and sunshine , view outside). We will analyze numerous examples of tourist complexes to understand how these spaces function. However, before analyzing these examples, we will conduct a brief study of tourism, particularly desert tourism in Algeria, to first grasp the general concept of tourist complexes and then delve into the examples in detail. Subsequently, a thorough site analysis will be undertaken to investigate the prevailing climatic conditions and the region's morphological features, allowing us to better determine the strategic options during the design phase.

- The liste of examples :



The Golden Gazelle



Kona village

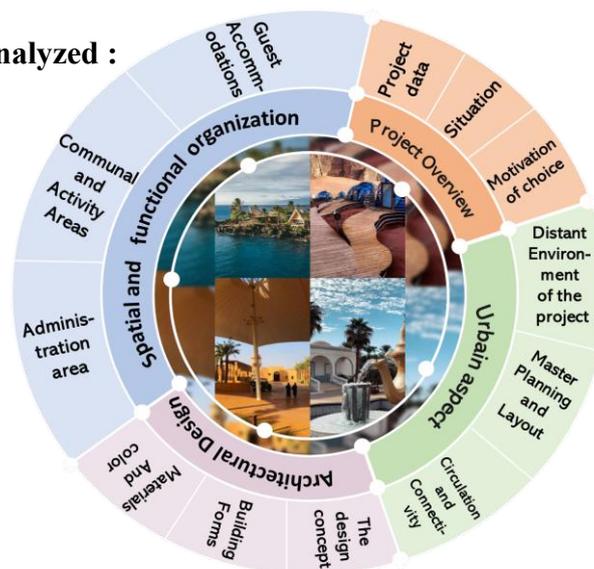


Al-Bedayer Desert
Camp



Memories Aicha
Luxury Camp, Wadi

- The elements to be analyzed :

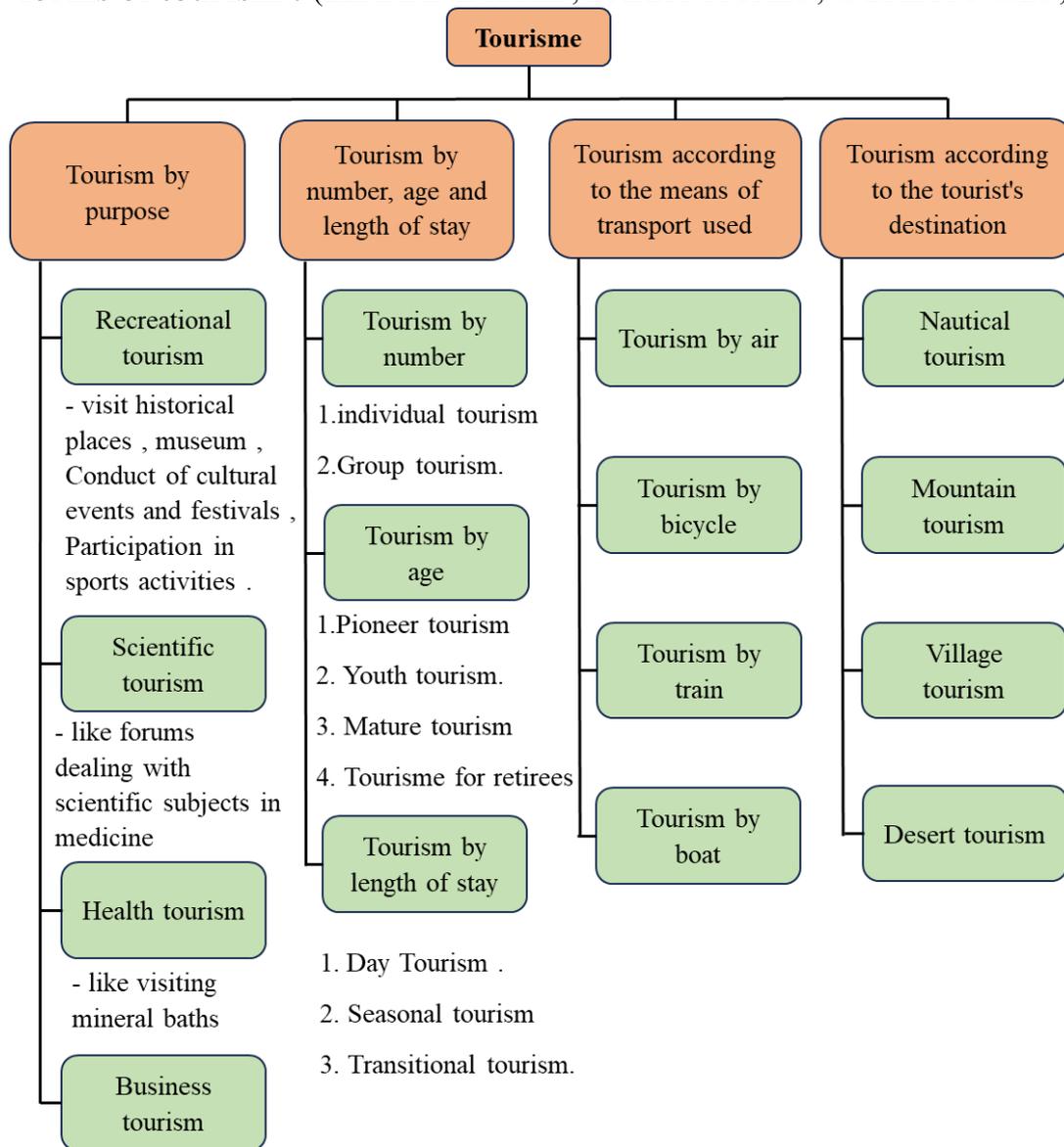


V.2 Theoretical overview of tourism :

V.2.1 Definition of tourism :

There are several definitions of tourism, the most important of which are : definition formulated by the World Tourism Organization (UNWTO, 2008): "tourism as a social, cultural and economic phenomenon involving the movement of people to places outside their usual environment for personal or professional reasons. These people are called visitors and may be tourists or excursionists, residents or non-residents." (MENASRA Asma , 2023)

V.2.2 forms of tourism : (ZERMANE Karim , BARHOUM Alia , & BADIS Nabila , 2021)



V.2.3 Tourism infrastructure:

Tourism infrastructure are the components built to cater to the needs and satisfaction of tourists. It is divided into two sections.

- **Physical tourism infrastructure :**

Includes accommodation, catering, , hotels, motels, restaurants, convention centers, stadiums, galleries.

- **Service tourism infrastructure :**

That attracts tourists includes banking institutions, travel agencies, insurance agencies, and tour guides. (MENASRA Asma , 2023)

V.2.4 Tourist Potential in Algeria:

Algeria is characterized by a diversity of natural landscapes and contains historical sites, making it a good tourist destination. The potential of Algeria lies in:

- Mountain ranges: The Tell Atlas and the Saharan Atlas.
- Diverse climate: A Mediterranean climate, with year-round sunshine and mild winters.
- Varied landscapes: Mountains, forests, northern coasts, and the southern Sahara.
- Rich cultural, historical, and civilizational heritage.
- 1,200 km of coastline and exceptionally beautiful sites: These offer ideal conditions for beach tourism, potentially attracting a significant number of both domestic and international tourists during the summer season, from Marsa Ben M'hidi to the province of El-Kala.

V.2.5 Hotel establishments in Algeria:

- Hotels
- Tourist complexes or holiday villages
- Apart-hotels or hotel residences
- Motels or roadhouses
- Tourist campsites.

V.2.6 Definition of touristic complex:

A tourist complex is a big resort that offers a wide range of services and amenities, including hotels, villas, restaurants, swimming pools, and recreational facilities, all within a single, self-contained resort. Its purpose is to provide a comprehensive and self-sufficient vacation experience for visitors.

V.2.7 The bioclimatic design of tourist facilities: (KHAWLA, 2017)

V.2.7.1 Passive Solar :

Passive solar design uses natural light and airflow to reduce the need for artificial lighting, heating, and cooling. Key strategies include:

- Orientating buildings in cold climates along an east-west axis and in hot climates perpendicular to the prevailing wind to optimize sunlight and airflow based on the climate.
- Using materials with high thermal mass (e.g., brick) to regulate indoor temperatures.
- Designing windows, insulation, and natural features (e.g., trees, terraces vegetation, and landscaping) to manage heat and airflow.

V.2.7.2 Using Daylight :

The goal is to optimize natural light for interior spaces using large windows, skylights, light wells, courtyards, and light-colored furniture. Technologies include: Light Shelves , Light Reflectors .

V.2.7.3 Renewable energy :

For rural tourism and hospitality businesses far from national grids, renewables like solar panels, solar water heaters, and wind turbines are cost-effective and sustainable solutions. Urban businesses can also use these technologies to meet energy needs and reduce peak load demands.

V.2.7.4 Landscaping :

Working on the landscape components of the establishment can serve to regulate the interior temperature, improve air quality, reinforce the identity of the place and bring visitors closer to nature.

V.2.7.5 Building location:

Once the site has been selected, and the means to minimize environmental impacts have been identified, the developer must determine the location of the building(s) to be constructed:

- Place buildings in areas with the least ecological and cultural value.
- Orient buildings for passive solar benefits, optimizing sunlight and shade to reduce heat gains in hot seasons.
- Position buildings for aesthetic views while maintaining privacy and security.
- Utilize natural features like existing trees for shade or wind protection and adapt to the site's topography

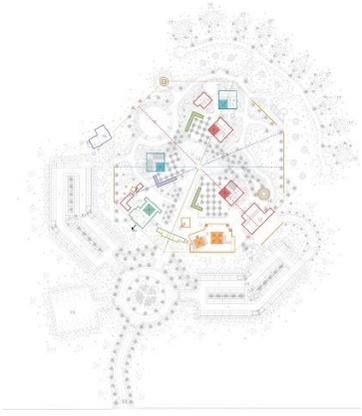
V.3 Exemples Analysis : (Anex 01)

The project	Project data	Situation	Motivation of choice
<p>Kona village</p> 	<p>- Date of realisation: 2023 - Architect: Walker Warner - Area: 331842 m²</p>	<p>is located north of Kailua-Kona on The Big Island of Hawaii,</p>	<p>The selection of Kona Village because it exemplifies sustainable architecture by prioritizing energy efficiency, water conservation, and minimal environmental impact. This project demonstrates how architecture can balance functionality, aesthetics, and a deep connection to nature.</p>
<p>Al-Bedayer Desert Camp</p> 	<p>- Date of realisation: 2020 - Architect: wael Al-Masri Planners & Architects - Area: 331842 m²</p>	<p>Located in the southern desert region of Sharjah along Dubai-Hatta Road, (Sharjah, UAE)</p>	<p>Al-Bedayer Desert Camp in Sharjah is a great example of sustainable architecture that blends perfectly with the desert landscape. It maximizes outdoor views and natural light, and follows the principles of smart and sustainable design for tourist villages</p>
<p>Memories Aicha Luxury Camp, Wadi Rum</p> 		<p>Memories Aicha Luxury Camp is located in Wadi Rum, just ten minutes away from the visitor centre</p>	<p>The selection of Memories Aicha Luxury Camp, Wadi Rum because it uses domes as a primary design element. The transparent surfaces maximize natural light and offer stunning views of the desert landscape. The camp also demonstrates a strong commitment to sustainability, incorporating eco-friendly materials.</p>

The project	Distant environment of the project	
<p>Kona village</p>		<ul style="list-style-type: none"> ➤ Kona Village is located on the pristine Kona Coast of the Big Island of Hawaii, surrounded by views of the mountains, Hualālai volcano and Kahuwai Bay.
<p>Al-Bedayer Desert Camp</p>		<ul style="list-style-type: none"> ➤ The resort is located next to Dubai-Hatta Road and is surrounded by sand dunes on all sides.
<p>Memories Aicha Luxury Camp, Wadi Rum</p>		<ul style="list-style-type: none"> ➤ The camp is located in a relatively flat area of Wadi Rum, surrounded by towering sandstone cliffs and red sand dunes.

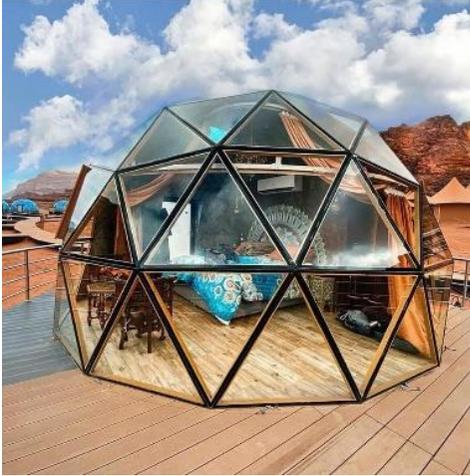
The project	Master Planning and Layout	
<p>Kona village</p>		<p>➤ the resort is planned so that dining and entertainment facilities are centrally located, easily accessible from guest rooms and overlooking the Kahuwai Bay .</p>
<p>Al-Bedayer Desert Camp</p>		<p>➤ the resort is planned s that the reception area is at the entrance, the accommodation units are at the end of the resort for guest privacy, and the activity areas are in the center of the complex for easy access by all guests."</p>
<p>Memories Aicha Luxury Camp, Wadi Rum</p>		<p>➤ Its design enhances the traditional Bedouin desert lifestyle, featuring 55 individually placed tents facing a central walkway that leads directly to the restaurant.</p>

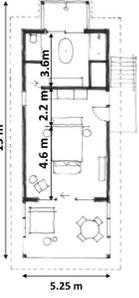
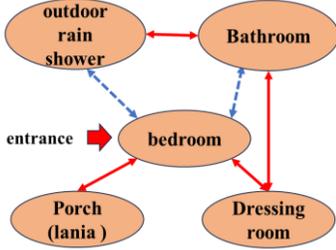
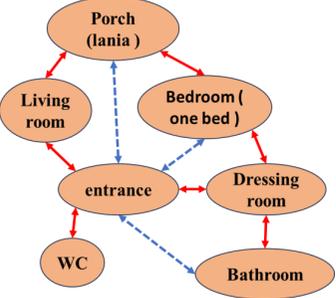
The project	Master Planning and Layout (Circulation and Connectivity)	
<p>Kona village</p>		<ul style="list-style-type: none"> ■ Vehicular Access ➔ Entree <ul style="list-style-type: none"> ➤ Drop-off points and parking area are located around the village to limit vehicle traffic and maintain the tranquility of the site ➤ Pedestrian paths meander smoothly through the village, allowing visitors to enjoy the scenery and natural terrain.
<p>Al-Bedayer Desert Camp</p>		<ul style="list-style-type: none"> ■ Vehicular Access ➔ Entree ■ Pathways <ul style="list-style-type: none"> ➤ Car traffic is restricted to designated areas and parking is located near the entrance to ensure a quiet environment within the complex. ➤ The walking paths are winding trails designed to mimic natural paths, allowing guests to take leisurely strolls and enjoy the scenic views.
<p>Memories Aicha Luxury Camp, Wadi Rum</p>		<ul style="list-style-type: none"> ■ Pathways <ul style="list-style-type: none"> ➤ The camp employs a network of sand paths and minimal vehicular roads to avoid disrupting the desert landscape. ➤ Pedestrian paths connect all domes to the central common areas, blending into the natural terrain.

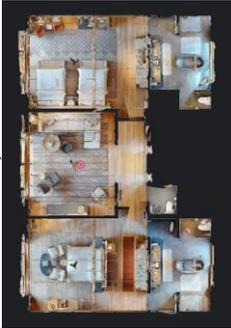
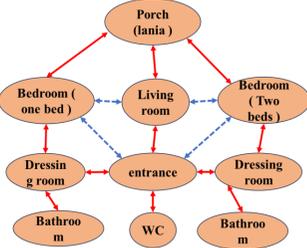
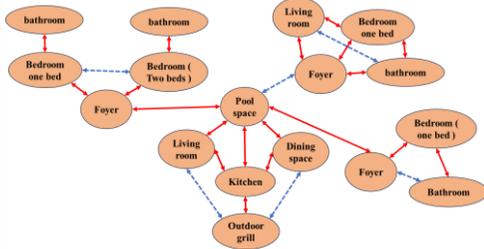
The project	Architectural Design (The design concept)	
<p>Kona village</p>	<ul style="list-style-type: none"> ➤ It is a redesign of the Kona Village resort on the island of Hawaii that was hit by the tsunami, aiming to preserve the unique travel experience that first attracted people to the village and a deep respect for the resort's past . ➤ “Our design is intended to showcase the island’s rich cultural history, while paying homage to its natural heritage—all while raising up the many talented artists and artisans who call Hawaii home.” Nicole Hollis, Principal, NICOLEHOLLIS 	
<p>Al-Bedayer Desert Camp</p>		<ul style="list-style-type: none"> ➤ The architectural design of the resort is inspired by traditional local architecture, such as the use of courtyards and pergolas that reflect the characteristics of the desert environment. Additionally, the concept of the octagonal shape is utilized to connect the various buildings of the project.
<p>Memories Aicha Luxury Camp, Wadi Rum</p>		<ul style="list-style-type: none"> ➤ The camp concept is inspired by the desert and Bedouin culture, offering a luxurious and authentic desert experience that respects the environment and honors the region's cultural heritage through luxurious tents and dome-shaped tents that provide panoramic views.

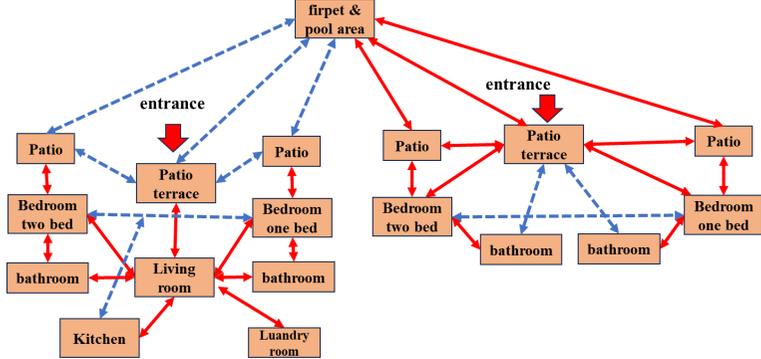
The project	Architectural Design (Building Forms)	
<p>Kona village</p>		<ul style="list-style-type: none"> The buildings have simple geometric shapes that give the Hawaiian cottages a simple, low-rise feel. Each guest hale is designed independently to capture the landscape and emphasize privacy. The roofs are typically steeply pitched or gently sloping, enabling efficient water runoff in the tropical climate.
<p>Al-Bedayer Desert Camp</p>		<ul style="list-style-type: none"> This design represents a unique blend of traditional Arab architecture and modern principles. It showcases a hybrid identity, where the buildings, such as the bedrooms, resemble luxurious tents, symbolizing Bedouin traditions. A large central tent covers the main courtyard, and the rest of the buildings bear the character of traditional architecture, such as towers.
<p>Memories Aicha Luxury Camp, Wadi Rum</p>		<ul style="list-style-type: none"> Dome: It is the shape that characterizes the restaurant and some rooms allowing to see panoramic views and wide views of desert views . Tents: The remaining facilities and rooms feature traditional Bedouin-style tents .

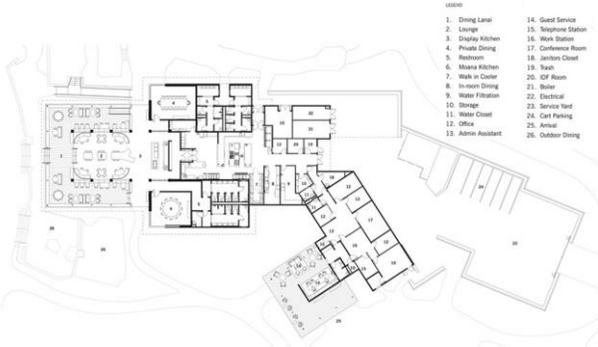
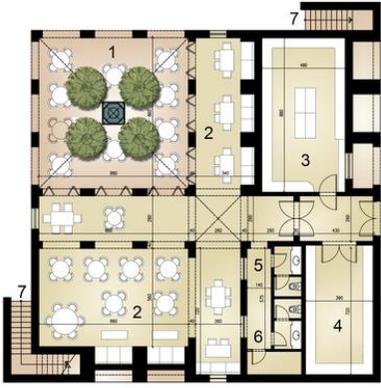
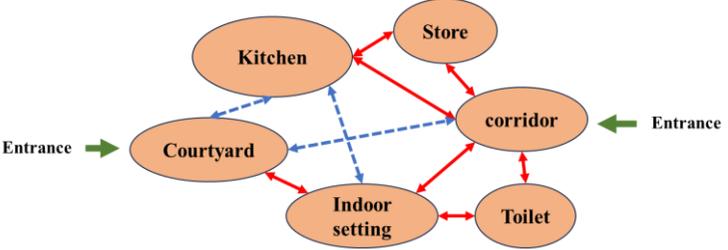
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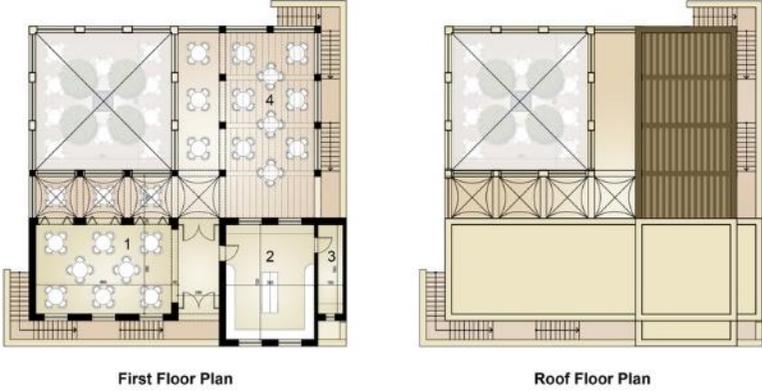
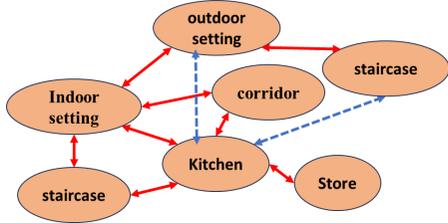
The project	Architectural Design (Materials and color)	
Kona village	 	<ul style="list-style-type: none"> - Structures are clad in recycled plastic thatch . - Hale interiors feature Douglas fir walls and ceilings and exposed wood framing- radiating warmth and brightness . <p>the colors are inspired from the surrounding natural beauty, with black , red tones , blues and yellows.</p>
Al-Bedaye Desert Camp		<ul style="list-style-type: none"> -The color of the building walls reflects the peach desert color . -Local, environmentally friendly materials were used: <p>RC structure , Synthetic Render (peach color),Steel Structure, Teflon , Aluminum for windows, Screens and pergolas , Stamped Concret , and Concrete Pavers</p>
Memories Aicha Luxury Camp, Wadi Rum	 	<ul style="list-style-type: none"> - The camp's structures were designed with sustainability in mind. Lightweight materials like fabric, wood, and metal were used, glass . - the color used are : yellows, oranges and reds inspired by the colourful sands of the desert.

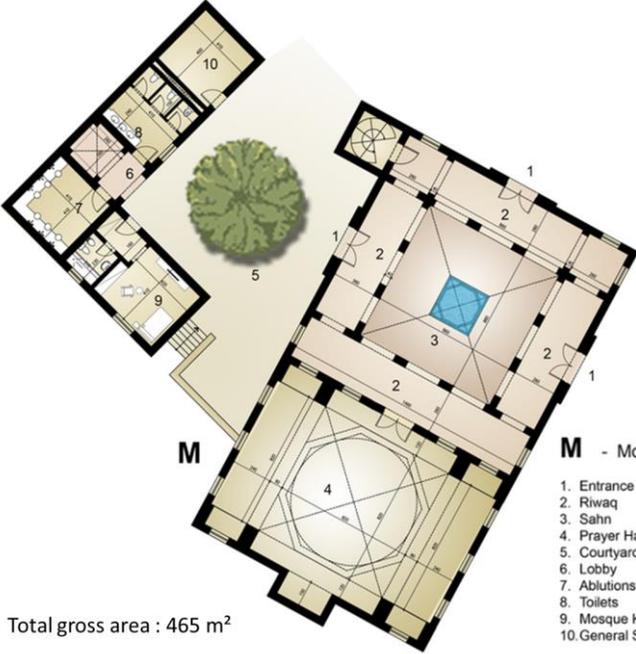
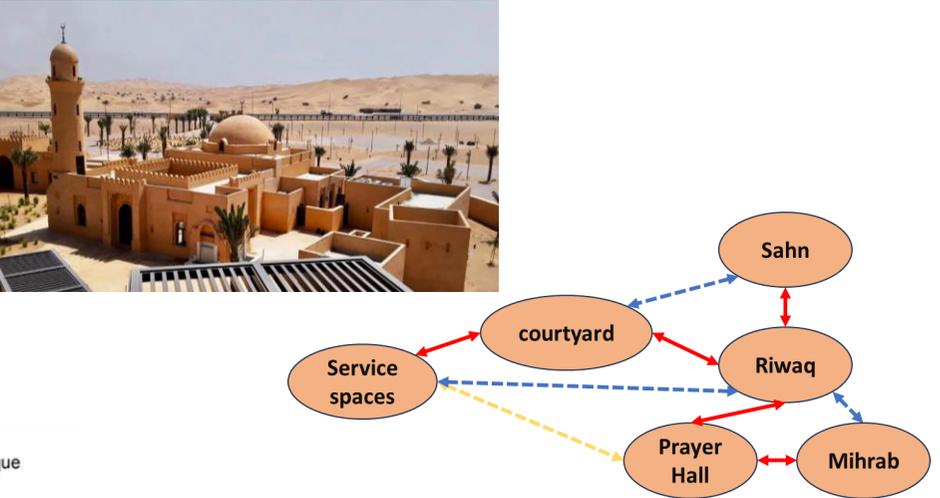
The project	Spatial and functional organization (Guest Accommodations)	
<p>Kona village</p>	<p>Rooms (Hale) 79 m²</p>  	<p>Suites (one Bedroom Kauhale) 149 m²</p>  
<p>Al-Bedayer Desert Camp</p>	<p>One-Bedroom Private Tent</p>  	<p>TWO-Bedroom Private Tente</p>  
<p>Memories Aicha Luxury Camp, Wadi Rum</p>	<p>Panoramic Luxury Suite</p> 	<p>Panoramic Luxury Tent 32 m²</p>  

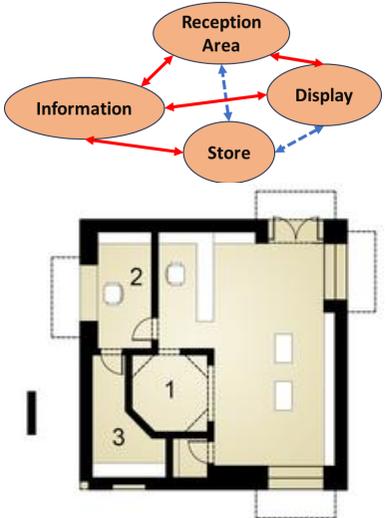
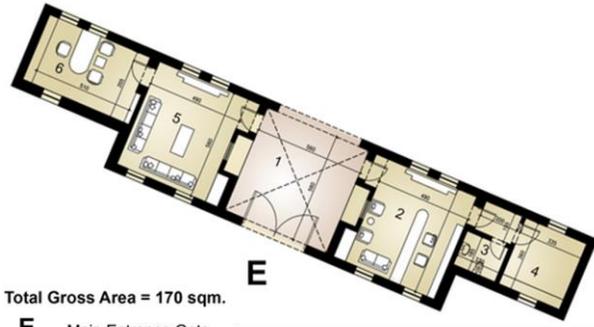
The project	Spatial and functional organization (Guest Accommodations)	
<p>Kona village</p>	<p>Suites (two bedroom Kauhale) 245 m²</p>   <p>Suites (Four bedroom Kumakea Kauhale) 497 m²</p>	 
<p>Al-Bedayer Desert Camp</p>	<p>Deluxe One-Bedroom Private Tent</p>   <p>- One-bedroom ,an indoor living room , outdoor sitting area , swimming pool</p>	<p>Deluxe Two-Bedroom Private Tent</p>   <p>- Two-bedroom ,an indoor living room , A private outdoor dining and barbeque space , outdoor sitting area , swimming pool</p>
<p>Memories Aicha Luxury Camp, Wadi Rum</p>	<p>Executive Luxury Tent 50 m²</p>     <p>- Equipped with one King Bed and one sofa bed , a living room , en-suite bathroom and shower</p>	

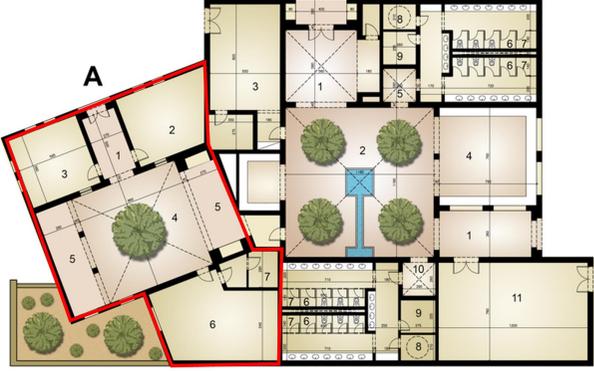
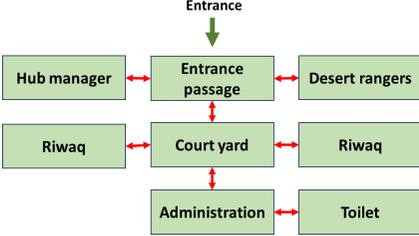
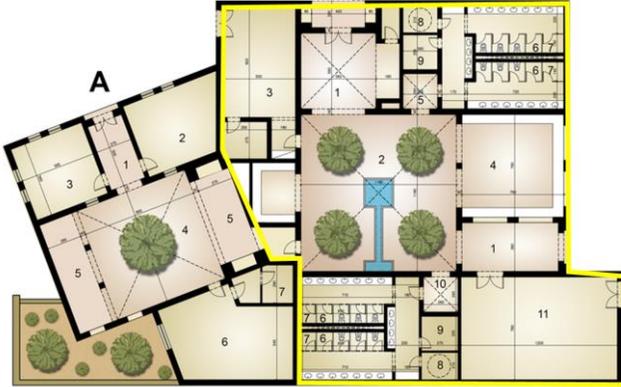
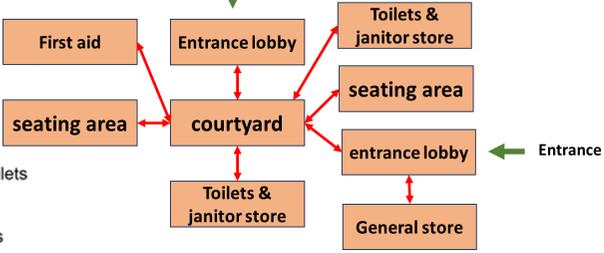
The project	Spatial and functional organization (Guest Accommodations)	
<p>Kona village</p>	<p>Suites (four bedroom Kauhale) 289 m²</p> 	
<p>Al-Bedayer Desert Camp</p>	<p>Deluxe Three-Bedroom Private Tent</p>   <p>- Three-bedroom ,an indoor living room , A private outdoor dining and barbeque space , outdoor sitting area , swimming pool</p>	<p>Deluxe Room</p>  <p>Grand Deluxe Room</p> 
<p>Memories Aicha Luxury Camp, Wadi Rum</p>	<p>The Junior Tents 35 m²</p>  	<p>- Equipped with a King Bed or two Twin Beds</p> <p>- The tents come with ensuite bathroom and shower</p>

The project	Spatial and functional organization (Communal and Activity Areas)	
<p>Kona village</p>	<p>Moana Restaurant</p> 	<p>➤ The restaurant features a seamless design where large windows allow diners to enjoy the natural beauty and the covered outdoor space also provides a direct connection to the surrounding environment. It is distinguished by its unique location, which allows for panoramic views of the landscape and the Pacific Ocean.</p>
<p>Al-Bedayer Desert Camp</p>	<p>The restaurant</p>  <p>R - Restaurant</p> <ol style="list-style-type: none"> 1. Courtyard 2. Indoor Sitting 3. Kitchen 4. Store 5. Male Toilets 6. Female Toilets 7. Stairs To First Floor 	 <p>➤ The ground floor has a courtyard surrounded by seating areas. There are trees and a water fountain in the courtyard. The courtyard leads to indoor seating areas. The kitchen, storage, and bathrooms are at the back of the restaurant for privacy. There's an outdoor staircase that leads to the upper level and is easy to get to.</p>
<p>Memories Aicha Luxury Camp, Wadi Rum</p>	<p>The restaurant</p> 	<p>➤ The restaurant is a large, dome-shaped structure seamlessly integrated into the natural landscape. It offers panoramic view of the landscape, desert slopes and the introduction of natural light. The decor is inspired by Badw culture.</p>

The project	Spatial and functional organization (Communal and Activity Areas)	
<p>Kona village</p> <p>Asaya Spa</p>		<ul style="list-style-type: none"> - Tranquil spaces atop the lava rock provide moments for relaxation before or after treatments, with a separate pathway leading to and from treatment rooms. - Asaya Spa, nestled into the lava rock with views of Hualālai volcano, embodies the earth's healing powers. - The spa is designed as a series of low-lying, rectangular pavilions to blend seamlessly with the surrounding landscape.
<p>Al-Bedayer Desert Camp</p>	 <p>1. Indoor Sitting 2. Kitchen 3. Store 4. Outdoor Terrace</p> <p>Total Net Area = 465 sqm.</p>	 <ul style="list-style-type: none"> - The first floor has an indoor seating area and an outdoor terrace that allows customers to enjoy the natural views. It also has an additional kitchen and storage room to support the kitchen and storage in the basement, improving efficiency and reducing service time.
<p>Memories Aicha Luxury Camp, Wadi Rum</p> <p>The coffee shop</p>		<ul style="list-style-type: none"> - The coffee shop serves as an excellent model for merging indoor spaces with the natural surroundings by incorporating the site's original rock formations into the cafe's design, thereby fostering sustainability and a direct connection to the environment.

The project	Spatial and functional organization (Communal and Activity Areas)	
<p>Kona village</p>	<p>fitness centre</p> 	<ul style="list-style-type: none"> - It is designed as a low, rectangular wing with floor-to-ceiling windows that seamlessly integrate the interior with the natural surroundings, creating an atmosphere full of natural energy.
<p>Al-Bedayer Desert Camp</p>	<p>Mosque</p>  <p>Total gross area : 465 m²</p> <p>M - Mosque</p> <ol style="list-style-type: none"> 1. Entrance 2. Riwaq 3. Sahn 4. Prayer Hall 5. Courtyard 6. Lobby 7. Ablutions 8. Toilets 9. Mosque Keeper 10. General Store/Services 	 <ul style="list-style-type: none"> - The mosque is designed with three entrances that lead directly to three arcades surrounding the central courtyard. In the fourth arcade, you'll find the entrance to the rectangular prayer hall. The mihrab is embedded in the qibla wall.

The project	Spatial and functional organization (Communal and Activity Areas)	
<p>Kona village</p>	<p>Shipwreck Adult Pool</p> 	<p>Shipwreck Pool Service</p> 
<p>Al-Bedayer Desert Camp</p>	<div style="display: flex; justify-content: space-between;"> <div data-bbox="353 758 784 1460" style="width: 45%;"> <p>Information</p>  <p>1. Display 2. Information 3. Store 4. Reception Area</p> <p>Total Gross Area : 88 m²</p> </div> <div data-bbox="806 845 1097 1141" style="width: 45%;"> <p>➤ The information center is strategically located right near the product entrance allowing visitors to be received.</p> </div> </div> <div style="margin-top: 20px;"> <p>Main Entrance Gate</p>  <p>Total Gross Area = 170 sqm.</p> <p>E - Main Entrance Gate</p> <p>1. Gateway 2. Police Office 3. Toilets 4. Store 5. Security Staff 6. Security Supervisor</p>  <p>➤ It's a main entrance and exit for visitors, featuring a police station, bathrooms, a storage area, a special room for security guards, and an office for security managers.</p> </div>	

The project	Spatial and functional organization (Administration area)	
<p>Al-Bedayer Desert Camp</p>	<p style="text-align: center;">Administration building</p>  <p style="text-align: center;">A - Administration Building</p> <div style="display: flex; justify-content: space-between;"> <ol style="list-style-type: none"> 1. Entrance Passage 2. Desert Rangers 3. Hub Manager 4. Courtyard <ol style="list-style-type: none"> 5. Riwaq 6. Administration 7. Toilet </div>  <ul style="list-style-type: none"> - The building has a clearly marked entrance leading directly to a entrance passage . On either side of the entrance passage are the desert rangers, which is responsible for managing desert tours and activities, and the center manager's office. From entrance passage , we move directly into the central courtyard, which is flanked by two corridors (riwaq) . The administration office and restrooms are located nearby. 	<p style="text-align: center;">Services Building</p> <p style="text-align: center;">Total Gross Area = 810 sqm.</p>  <p style="text-align: center;">S - Services Building</p>  <ul style="list-style-type: none"> - The building is designed with a distinct entrance that opens up into a entrance lobby. Beyond the lobby lies a central courtyard with an outdoor and a natural fountain. This courtyard enhances natural light and ventilation and provides easy access to other areas, including a first-aid room (which also has a direct exterior entrance), restrooms, changing rooms, and a storage room.

Existing example :

The Golden Gazelle, Oued Souf :

1. Project data :

- **Project owner:** MEHRI Group
- **Project manager:** Mohammed SID
- **Surface area:** 104 h
- **Prizes:** 2015 President of the Republic Prize for Architecture and Urban Planning



Figure 1 : The Golden Gazelle
Source : [Pinterest](#) consulted on: 07/03/2024

2. Situation_:

- Located in the heart of the palm grove of the “Edhaouia” residence in the city of El Oued, the famous city of a thousand domes 5 km from the city center.

3. Motivation of choice :

- The Golden Gazelle Hotel was chosen because it perfectly reflects the cultural heritage of Algerian and Saharan architecture while incorporating modern sustainability principles. Its location is in a desert region, but its most distinctive feature is its desert climate, which is ideal for the study area. Plus, it promotes a focus on outdoor scenery with its beautiful landscaping, greenery, and features like fountains .

4. Distant environment of the project :

- Located in the heart of the Algerian Sahara, La Gazelle d'Or provides a serene oasis amidst the desert landscape. The resort's architecture and design are thoughtfully integrated into the natural surroundings

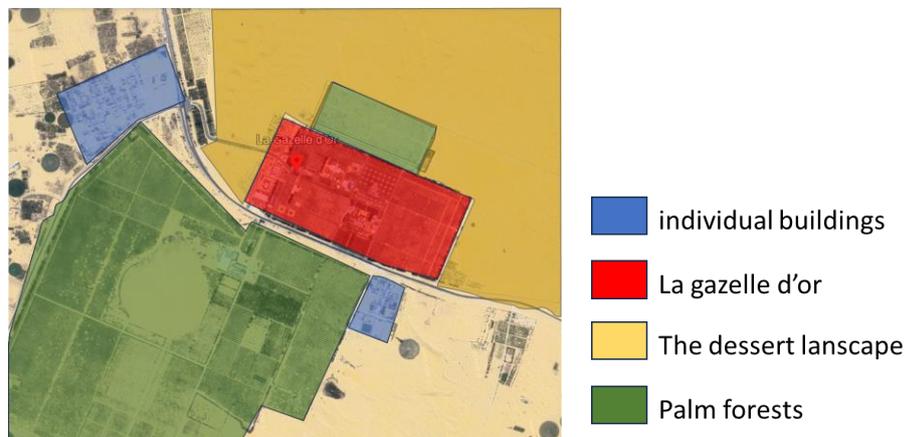


Figure 2 : (left) the distant environment of the project– (right) map key

5. Master Planning and Layout :

- The Master planing for the complex clearly shows that is divided into three main sections: guest accommodation, public areas, and service areas. The guest accommodation section, is further subdivided into dome hotel, villas , royal suit , Tuareg tents , nomadic tentes .
- Courtyards and green spaces are used as transitional areas between indoor and outdoor spaces, offering natural ventilation and shaded spaces for relaxation.
- Public areas such as the restaurant and recreation halls are centrally located for easy access.
- The complex is harmonious and complementary to the surrounding desert environment, enhancing the site's harmony with the cultural and environmental identity of the region.

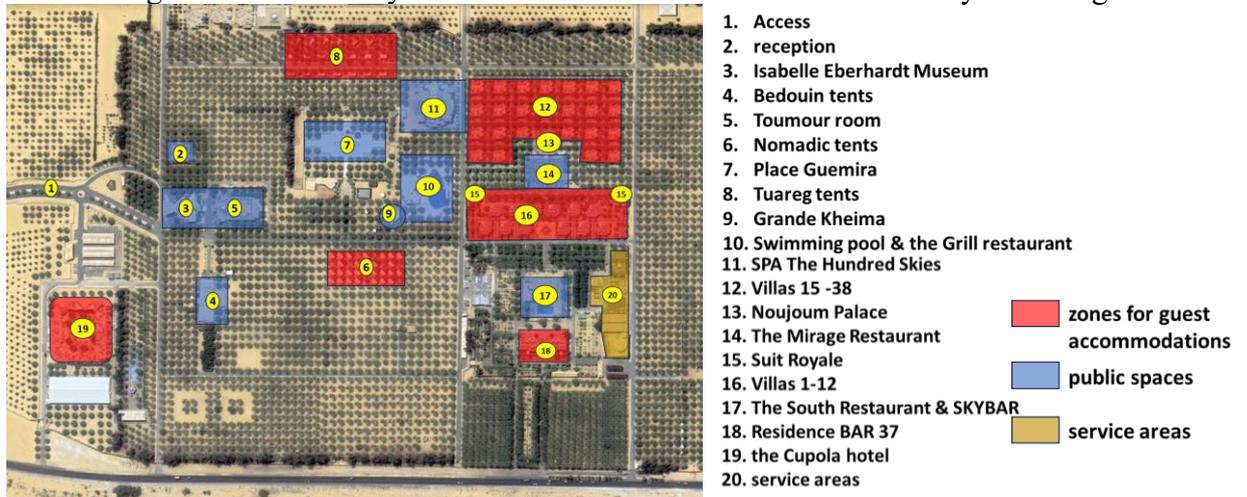


Figure 3 : (left) Master Planning and Layout - (right) map key

6. Circulation and Connectivity :

A. Vehicular Access:

- Vehicle pathways are laid out in a well-organized network connecting various parts of the project and providing direct access to parking areas and main facilities.
- Parking space have been placed near the main entrances to improve access and reduce congestion

B. Pathways:

- Pedestrian walkways are strategically placed throughout the site to facilitate smooth movement between different units..
- Guests ride bicycles to get around the resort .

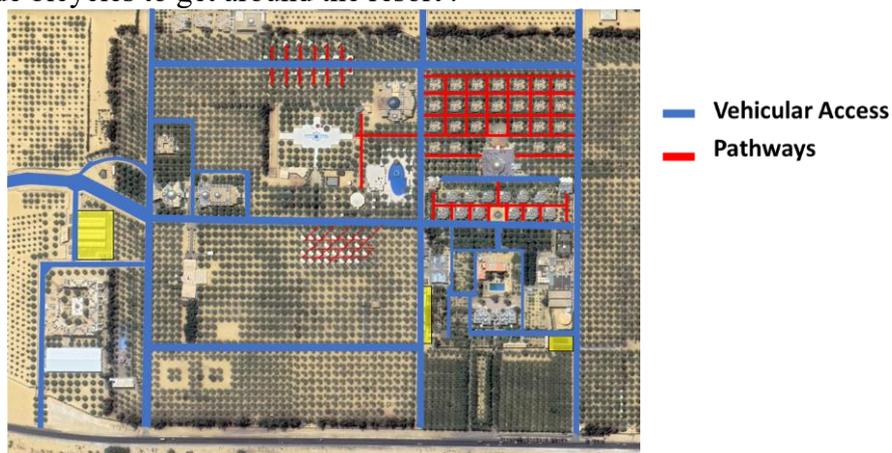


Figure 4 : Circulation and Connectivity

7. Architectural Design :

A. The design concept :

- The Golden Gazelle complex is a remarkable fusion of modern functionality and traditional Oued Souf design principles, such as domed roofs and arches, seamlessly blending with the

essence of desert culture. It embodies a luxurious yet eco-friendly experience, serving as a prime example of sustainable development in arid regions.



Figure 5 : The Golden Gazelle
Source : [Pinterest](#) consulted on: 07/03/2024

B. Building Forms:

- The shapes of the buildings in the complex reflect a harmonious blend of traditional and modern design, characterized by low height, a domed roof, and arched openings, all inspired by the traditional architecture of the Wadi Souf.



Figure 6 : Buildings in the complex
Source : [La Gazelle d'Or Resort & Spa](#)

C. Materials and colors :

- Bricks were used for construction, while treated camel hair canvas , resistant to water and sunlight, was utilized for tents. As for colors, white predominated, along with earthy tones such as beige and sand, reflecting the hues of the desert.



Figure 7 : Materials and colors of the complex
Source: author

D. Spatial and functional organization :

- **Villas:**
 - Area : 160 m²
 - they have a large living room, a King bedroom and a bathroom with bathtub, a Twin bedroom and a bathroom with shower, a kitchenette and a private terrace of 29 m².

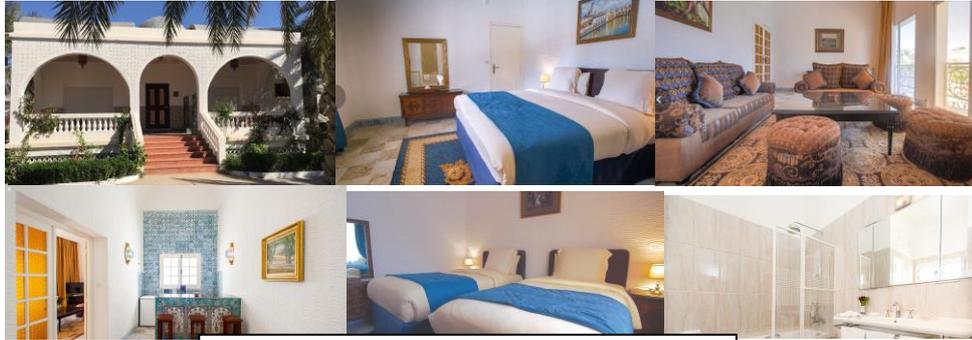


Figure 8 : Villas

Source : [Villa Suite | La Gazelle d'Or](#)

- **King Deluxe Bed Bed :**

- they have a King delux bedroom and a bathroom, and a private terrace of 29 m².



Figure 9 :King Deluxe Bed Bed

Source : [King Deluxe Bed Bed | La Gazelle d'Or](#)

- **Communicating Villas:**

- they have a King bedroom and a bathroom, a Twin bedroom and a private terrace of 29 m².



Figure 10 :Communicating Villas

Source : [description here | La Gazelle d'Or](#)

- **TOUAREG tent :**



Figure 11 : TOUAREG tent

Source : [Tente Tout Confort TOUAREG | La Gazelle d'Or](#)

- **Noumade tent :**

- Area : 32 m²
- they consist of two single beds (twin) and a private bathroom with shower.



Figure 12 : Noumade tent

Source : [description here](#) | [La Gazelle d'Or](#)

- **the Cupola hotel :**

- Category : 3 stars
- The hotel prominently features dome-shaped roofs, inspired by the vernacular architecture of the Oued Souf region.
- These domes are both functional and aesthetic, aiding in natural cooling by promoting air circulation and reducing heat buildup.
- Rooms number : 87 rooms
- Contains : The Standard Suite , Standard Communicating Rooms , Standard Twin Room .



Figure 13 : the Cupola hotel

Source : [Pinterest](#) consulted on: 07/03/2024

- **The Cupola Restaurant :**



Figure 14 : The Cupola Restaurant

Source : [RESTAURANT LA COUPOLE](#) | [La Gazelle d'Or](#)

- **Conference Room:**

- **Toumour Room :**
- multipurpose room for seminars, conferences and receptions with 500 seats.

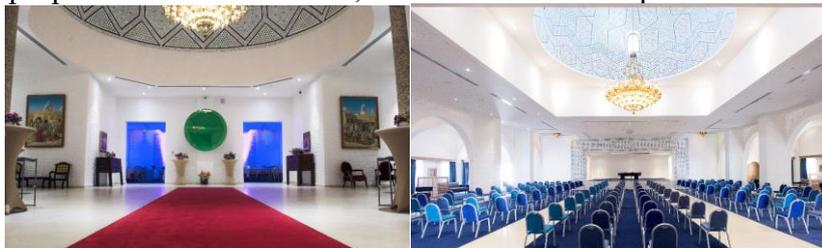


Figure 15 : Toumour Room

Source : [Salle Toumour](#) | [La Gazelle d'Or](#)

- **Large khaima room :**
- conference room under traditional tent with 150 seats. When there are no meetings, it turns into a childcare and playroom.



Figure 16 : large khaima room
Source : author

- **Pool :**
- A beautifully designed pool offering a refreshing oasis amid the desert, surrounded by palm trees and lounging areas.



Figure 17 : Pool
Source : [Pinterest](#) consulted on: 07/03/2024

- **THE GRILL restaurants :**
- The restaurant features open spaces with a domed ceiling and shaded outdoor seating areas. It offers a delightful blend of dining and relaxation near the pool.



Figure 18 : THE GRILL restaurants
Source : [LE GRILL](#) | [La Gazelle d'Or](#)

- **The Mirage restaurant :**
- Its design is a fusion of modern and ancient elements, such as domes and arches, with semi-private seating areas covered under the arches and featuring large panoramic openings for enjoying the outdoor views. A large central dome provides a beautiful vista. There are also outdoor seating areas for enjoying the desert scenery. Additionally, the restaurant is located in the center of the villas for easy access by customers.



Figure 19 : The Mirage restaurant
Source : [LE MIRAGE | La Gazelle d'Or](#)

- **The South Restaurant & SKYBAR :**

- The design harmoniously blends modern and ancient elements, such as arches, creating semi-private seating areas underneath with expansive panoramic views. Outdoor seating allows guests to enjoy the pool and desert landscape with its palm trees. The skybar offers panoramic desert and palm tree vistas .



Figure 20 : The South Restaurant & SKYBAR
Source : [Restaurant Le SUD | La Gazelle d'Or](#)

- **SPA The Hundred Skies :**

- Facilities for relaxation and rejuvenation, including massage rooms, saunas, and traditional hammams.
- A swimming pool enclosed by a large glass dome, offering panoramic views of the sky and allowing for stargazing.

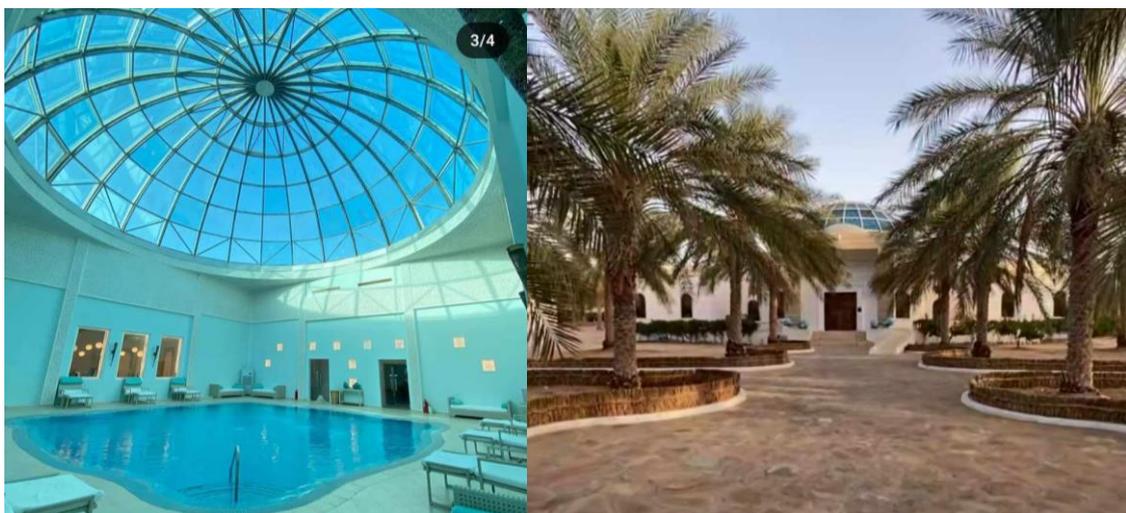


Figure 21 : SPA The Hundred Skies
Source : [description here | La Gazelle d'Or](#)

- **Fitness Center:**
 - A well-equipped space for guests to maintain their fitness routines while on vacation.



Figure 22 : Fitness center
Source : [Instagram](#)

- **Isabelle Eberhardt Museum :**
 - Salon Isabelle Eberhardt the Swiss adventurer and writer Isabelle Eberhardt, who found inspiration in the vast expanses of the Souf desert. This salon, decorated with antique and elegant touches, invites you to travel back in time and discover the poetic soul of the Sahara.



Figure 23 : Isabelle Eberhardt Museum
Source : [Instagram](#)

V.4 Analytical synthesis of examples :

	Synthesis
Situation	All projects are situated in diverse natural environments, ranging from coastal to arid regions. This indicates that project locations were carefully selected to harmonize with the surrounding environment and foster a strong connection between the built and natural environments.
Distant environment	The projects are surrounded by stunning natural environments, ranging from beaches and sand dunes to rocky desert landscapes. They aim to integrate buildings with their surroundings, offering visitors a unique experience blended with nature.
Master Planning and Layout	All projects were designed with functional organization in mind. Common facilities (such as restaurants and swimming pools) are centrally located for easy access, while residential units are distributed to ensure privacy and maximize natural views. Green spaces and courtyards can be used as transitional elements that enhance natural ventilation.
Circulation and Connectivity	All projects focus on reducing vehicular traffic within the site to minimize congestion. Therefore, vehicular traffic and parking areas are concentrated at the site boundaries or entrance. Pedestrian walkways connecting all facilities are dedicated to provide visitors with a pleasant experience characterized by enjoying natural landscapes, tranquility, and peace .
Building Forms	The projects feature architectural styles inspired by local environments, such as domes and traditional tents, while maintaining a modern design. These forms showcase a blend of tradition and modernity to provide a unique visitor experience.
Materials and color	The projects use sustainable and eco-friendly materials like local wood, with colors inspired by the surrounding nature to promote harmony with the environment.
Spatial and functional organization	The projects offer a diverse range of accommodations, from opulent tents to traditional-style rooms and modern suites. Public amenities such as restaurants, spas, and activity areas are designed to maximize comfort and harmonize with the natural surroundings .
natural lighting	the projects emphasize the use of natural lighting to enhance the interior ambiance and reduce energy consumption .
View outside	the projects focus on integrating natural landscapes into the design, highlighting the unique features of each location. seamlessly blend the built and natural environments, offering smooth transitions between indoor and outdoor spaces. Large windows and domed ceilings provide stunning panoramic views, allowing guests to feel fully immersed in their surroundings.

V.5 Site Analysis :

1- Presentation of case study :

M'chouneche is a small oasis of 93,000 palm trees and more than 7000 inhabitants installed at more than 300 meters of altitude. The commune is located 30 km northeast of the city of Biskra , one of the Saharan regions in the South East of Algeria.



Situation of M'chouneche in the city of Biskra

2- site location in relation to the city :

The site located in in the M'richi area north of the city of M'chouneche in the city of Biskra. The site is on a vast palm grove on the edge of the valley of Ighzer amellal .

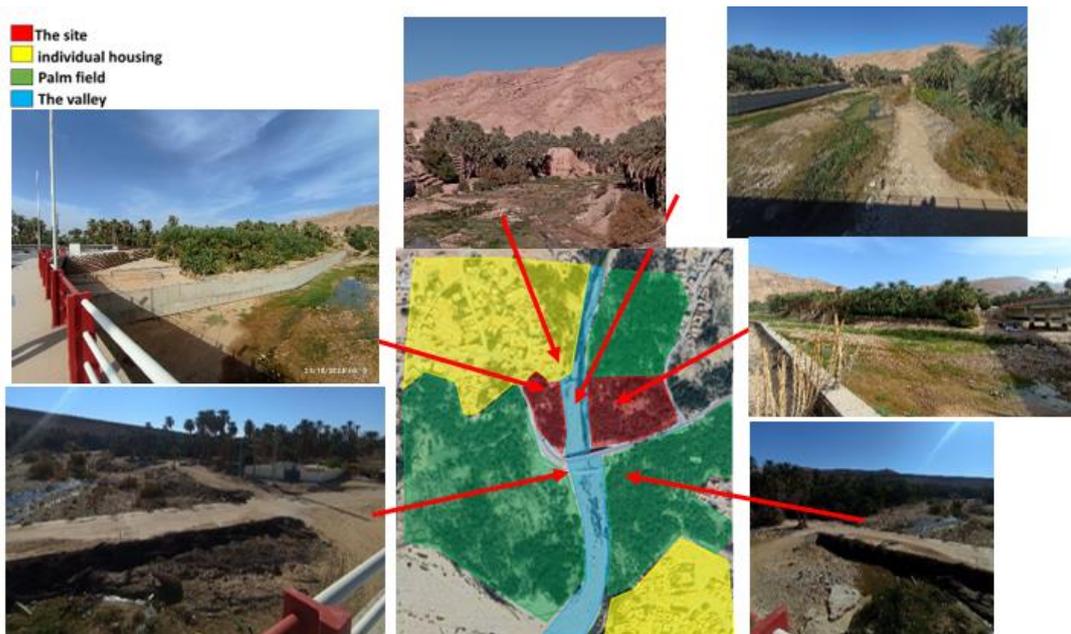


strategically located, offering stunning natural landscapes and ample natural lighting. It provides easy access by car while remaining away from noise and disturbances, ensuring a peaceful and serene environment.

3- why this land :

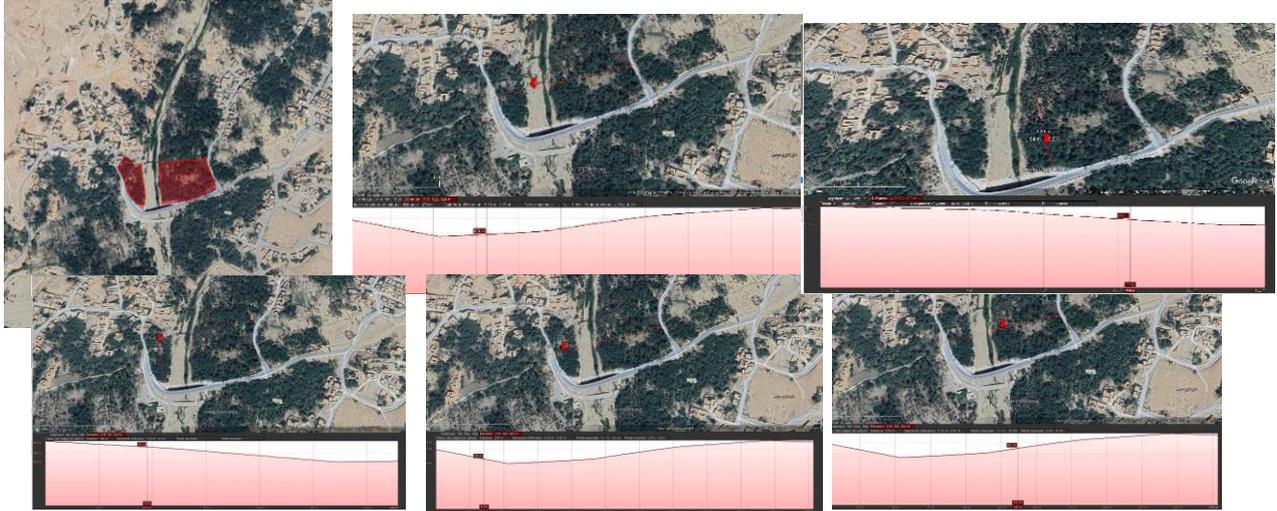
- The site is strategically located, offering stunning natural views and a peaceful environment.
- It is easily accessible by car while remaining secluded from noise and
- disturbances.

4- environment of the project :



A harmonious eco-tourism retreat, seamlessly integrated into the natural landscape, surrounded by palm groves and beautiful terrain. Its proximity to the old village of Mchouneche (Douar , Dachra) enriches the experience with cultural authenticity, offering a unique blend of nature and heritage.

5- site morphology :



The site is located along both edges of the valley in a slightly sloped area. To prevent any risk of flooding or water accumulation, the elevation of the development needs to be increased, ensuring that all structures remain safely above the valley level.

6- Roads and accessibility :



primary road

The site is bordered by a primary road, and there are not many pathways, meaning there is little disorder.

7-Environmental data :

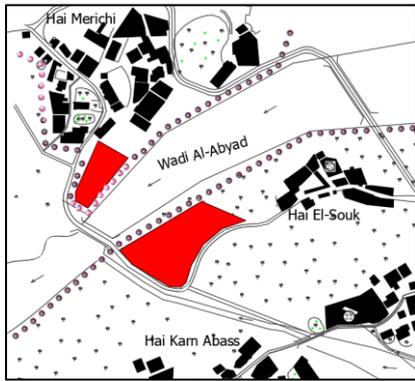
M'chouneche is characterized by a hot and dry climate most of the year with a short winter extending from December to February . The geographical features of the city are:

- The latitude = 34.48 N.
- The longitude = 5.44 N.
- The altitude which is equal to 128 m above sea level.

Temperature	Relative Humidity	Precipitation
Max. Temp: 42 °C in July	Max. R.H: 50% in January	Max: 200 mm per Year
Min. Temp:7 °C in January	Min. R.H:10% in July	
Average annual Temp: 21.5 °C		

Climatic Data of Biskra

8- Built and unbuilt system :



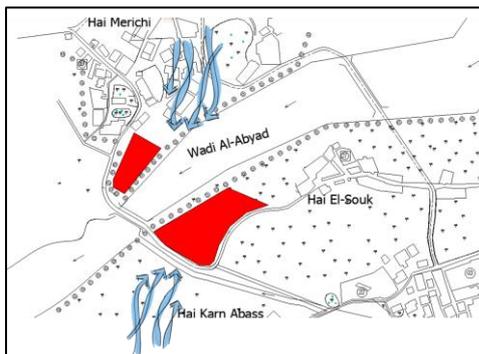
The study area shows a clear distinction between dense urban fabric (yellow) and undeveloped land (green), with green spaces exceeding built spaces, while the proposed site (red) requires careful integration with its surroundings.

9-Green spaces :



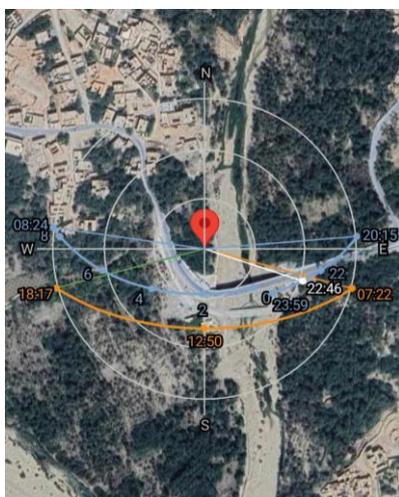
The study area is dominated by green spaces, which significantly exceed the built environment, ensuring a strong natural presence in the landscape.

10- Wind :



The dominant wind directions are from the southeast and northwest

10- Sun :

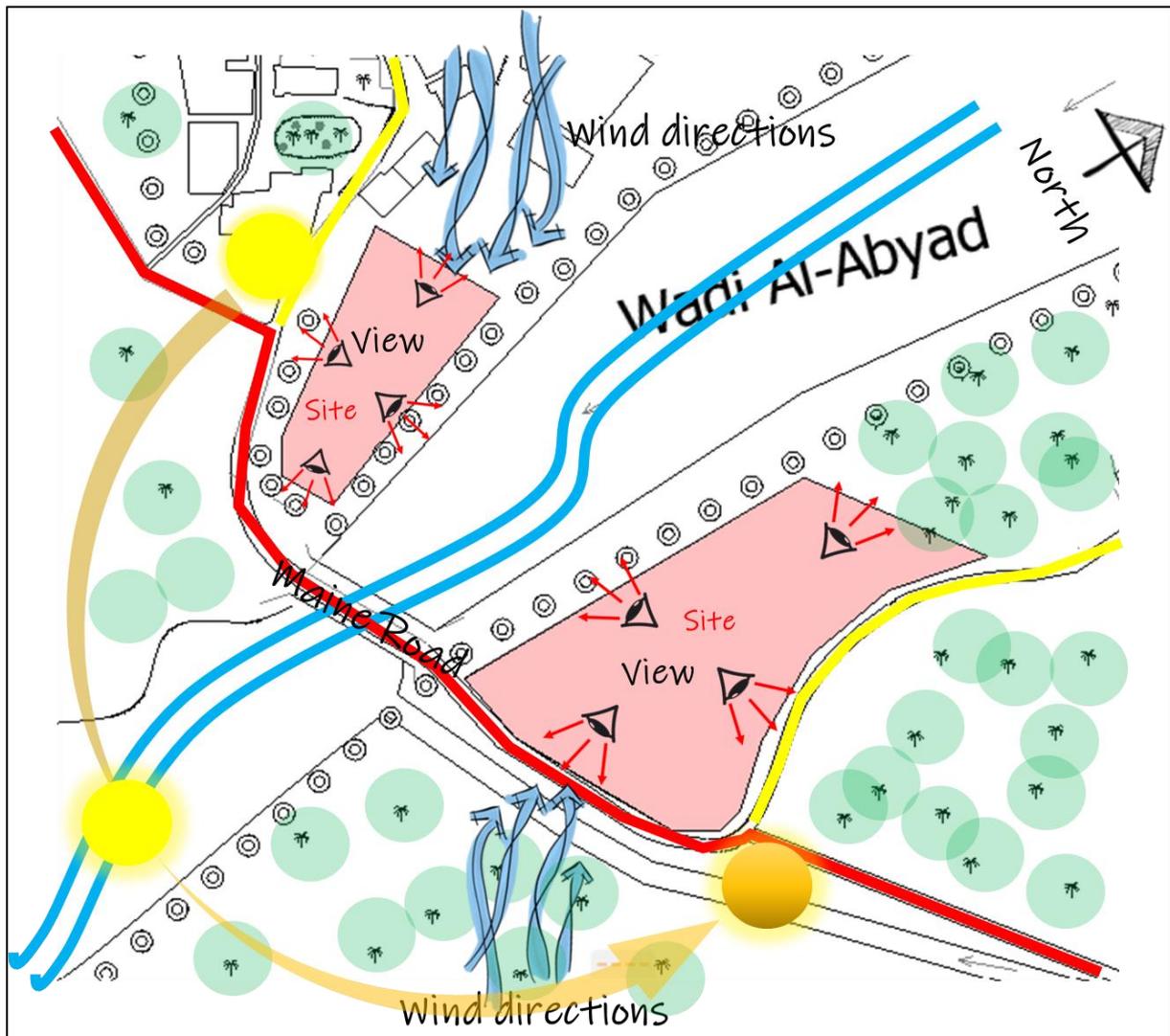
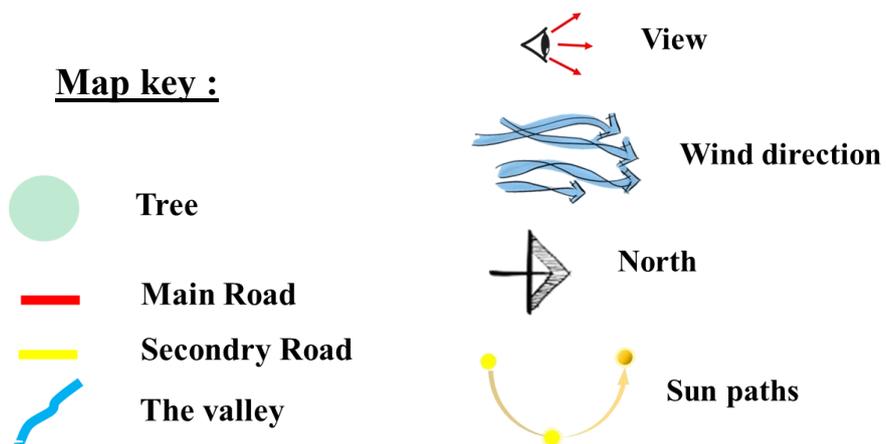


Time	Feb 14, 2025 (Azimuth / Altitude)	June 21, 2025 (Azimuth / Altitude)	Dec 21, 2025 (Azimuth / Altitude)	March 20, 2025 (Azimuth / Altitude)	Sept 22, 2025 (Azimuth / Altitude)
00:00	329.6 / -65.3	349.9 / -31.0	325.1 / -76.3	341.4 / -53.8	347.7 / -54.1
01:00	6.4 / -68.0	6.0 / -31.4	28.0 / -77.2	7.2 / -55.0	13.4 / -55.1
02:00	40.0 / -63.0	21.5 / -28.5	64.2 / -68.1	31.3 / -50.7	36.1 / -50.8
03:00	61.3 / -53.4	35.3 / -22.5	80.0 / -56.3	49.9 / -42.8	53.3 / -48.0
04:00	74.9 / -42.0	47.0 / -14.8	89.9 / -44.1	63.7 / -32.5	66.3 / -29.6
05:00	85.1 / -29.9	57.0 / -4.8	97.9 / -31.9	74.6 / -21.0	76.7 / -17.9
06:00	93.8 / -17.6	65.5 / 6.1	105.3 / -19.9	83.8 / -9.0	85.7 / -5.8
07:00	102.0 / -5.4	73.2 / 17.5	112.9 / -8.3	92.4 / 3.6	94.3 / 6.7
08:00	110.7 / 6.6	80.6 / 29.5	121.3 / 3.0	101.3 / 15.6	103.4 / 18.7
09:00	120.4 / 17.6	88.4 / 41.7	130.9 / 12.7	111.2 / 27.4	113.8 / 27.3
10:00	132.0 / 25.5	99.1 / 55.8	142.2 / 21.2	121.9 / 37.3	124.5 / 35.6
11:00	146.8 / 35.6	111.9 / 65.8	155.6 / 27.5	139.8 / 47.6	144.5 / 45.9
12:00	163.8 / 40.8	141.9 / 75.9	170.8 / 31.1	161.5 / 53.7	167.5 / 54.5
13:00	183.3 / 42.0	204.2 / 77.5	186.9 / 31.3	187.3 / 54.9	193.6 / 54.9
14:00	202.8 / 39.5	242.7 / 68.8	202.4 / 28.2	211.3 / 50.8	216.4 / 47.9
15:00	218.7 / 33.2	259.2 / 57.1	216.1 / 22.2	229.9 / 42.8	233.7 / 40.4
16:00	231.2 / 24.5	269.6 / 47.8	227.5 / 14.0	238.8 / 32.5	246.9 / 29.6
17:00	243.1 / 14.1	277.4 / 32.7	237.5 / 4.4	254.6 / 21.0	256.9 / 17.9
18:00	252.4 / 2.9	284.8 / 20.6	246.0 / -6.7	263.9 / 9.0	265.9 / 6.9
19:00	260.9 / -9.3	292.4 / 9.0	253.7 / -18.2	272.5 / -3.1	274.5 / -6.5
20:00	269.2 / -21.5	300.7 / -1.5	261.1 / -30.2	281.4 / -15.6	283.6 / -18.6
21:00	278.3 / -33.8	310.2 / -12.1	268.9 / -42.4	291.4 / -27.3	294.0 / -30.3
22:00	289.3 / -45.7	321.4 / -20.7	278.4 / -54.7	303.7 / -38.2	307.1 / -40.9
23:00	305.0 / -56.6	334.7 / -27.2	293.0 / -66.5	320.0 / -47.4	324.6 / -49.5

The sun rises from the southeast and sets in the southwest, providing a good balance of natural light throughout the day .

Solar Position Data (Azimuth & Altitude)

Synthesis :

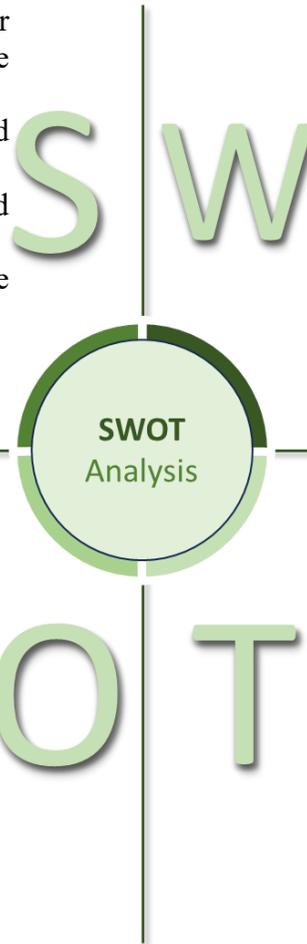
**Map key :**

Strengths:

- A strategic location amidst breathtaking natural landscapes, enhancing the creation of attractive outdoor views and allows for strong integration with the environment
- A quiet and secluded area, far from noise and disturbances.
- Rich cultural heritage due to its proximity to the old village of Mchouneche ("Dachra").
- Suitable topography, where variations in terrain can be utilized to maximize scenic views.

Weaknesses:

- Slightly isolated from essential facilities.
- Limited road access for easy transportation.
- Risk of valley flooding due to its location on the edge of the wadi.
- Hot and dry climate for most of the year, with a short winter.

**Opportunities:**

- Bundance of green spaces that can be utilized in the design, both for views from inside the buildings and in the master plan layout.
- Strong exposure to sunlight, allowing for excellent natural lighting in various areas.
- Potential to integrate local heritage and culture into the tourism experience.

Threats:

- Environmental challenges such as extreme heat and the risk of Valley flooding.
- The need for integration with the natural landscape to preserve it and maintain ecological balance.

Practical chapter

VI.1 Introduction :

This chapter is divided into two main sections: a practical section and an architectural section. In the first part, based on the information presented in theoretical Chapter and methodologique chapter, a rotation mechanism will be developed, featuring both automatic and manual control modes. The second part outlines the implementation steps of the tourist village project, using theoretical foundations from the previous chapters. The proposed rotation mechanism will be applied to the bungalows within the village.

VI.2 Practical part :

VI.2.1 Rotational Mechanism for a Bungalow :

In the context of developing a smart and sustainable tourist village, this part presents a rotating mechanism for a dome-shaped house. It is part of a sustainable architectural and mechanical solution. The main idea is to rotate the house seasonally based on a pre-programmed solar path: it turns with the sun's direction during winter and against it during summer. The goal is to improve thermal comfort, provide better natural lighting, and enhance views of the surrounding landscape.

VI.2.2 Problem Statement and Motivation :

Traditional fixed buildings often fail to respond to seasonal solar changes. This leads to overheating in summer and cold temperatures in winter. In addition, guests of the eco-tourist village may prefer to enjoy different natural views. Therefore, the challenge is to:

- Design a reliable, low-energy rotating base that moves slowly according to seasonal solar behavior.
- Ensure manual control is possible for users.
- Create a scalable mechanism, from a prototype to a full-scale application.

VI.2.3 Objectives :

- Designing a rotation system based on sun path data.
- Designing a dual-mode control system: automatic for sun tracking and manual based on user preference.
- Provide thermal control by rotating away from the sun during summer, and toward it during winter.
- Ensure user comfort through view optimization.
- Construct a physical prototype using Arduino components.

VI.2.4 System Overview :

1. Operating Principle

- Summer: Rotate the Bungalow away from direct sunlight.
- Winter: Rotate the Bungalow toward sunlight for heat gain.
- Rotation is slow and programmable based on solar data.

2. Control Modes :

- Automatic mode: Based on programmed sun path calendar.
- Manual mode: User can rotate to desired view.

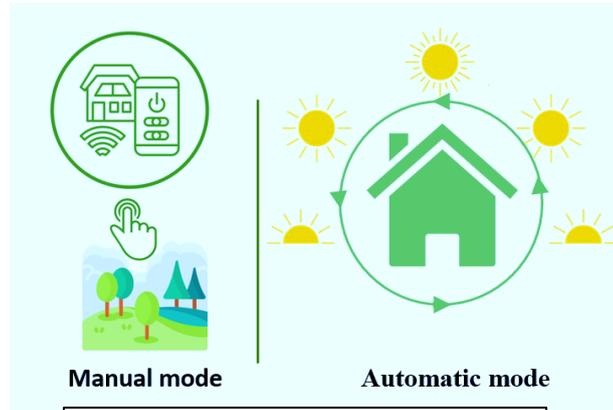
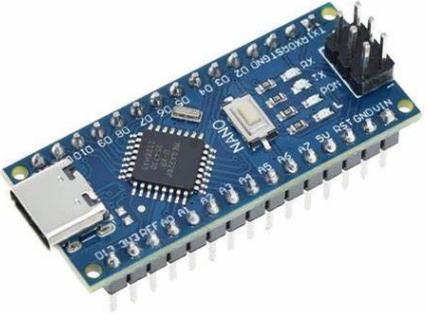
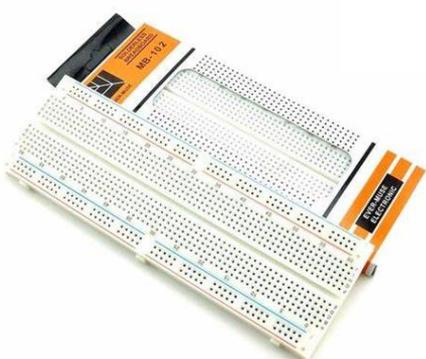


Figure 01 : Controle modes
Source : Author

VI.2.5 Prototype Hardware Components :

The mechanism was modeled at prototype scale using Arduino-based components to simulate the final rotation behavior. The following materials were used:

Component	Quantity	Function	Image
Arduino Nano Type C	1	Microcontroller that runs the programmed control logic	
Breadboard mb102	1	Allows temporary circuit assembly without soldering	
LDR (Light Dependent Resistor)	4	Detects light intensity (optional in final version, used for testing)	

<p>Resistors 10k</p>	<p>8</p>	<p>They regulate the flow of electrical current in a circuit to prevent components from being damaged</p>	
<p>Servo MG996R</p>	<p>1</p>	<p>It is a motor with a built-in driver that receives signals from the Arduino to control the mechanism as an output.</p>	
<p>LCD 1602 I2C</p>	<p>1</p>	<p>Displays system state, and operational mode</p>	
<p>Push Buttons</p>	<p>4</p>	<p>Manual control for rotating left/right, mode switching, and reset</p>	
<p>12V DC Jack</p>	<p>1</p>	<p>Power input to feed the entire system</p>	
<p>LM2596 Voltage Regulator</p>	<p>1</p>	<p>Regulates voltage from 12V to 5V for Arduino and LCD</p>	

The following diagram illustrates the general architecture of the bungalow rotation prototype system, showing the interaction between input components, control unit, and mechanical output :

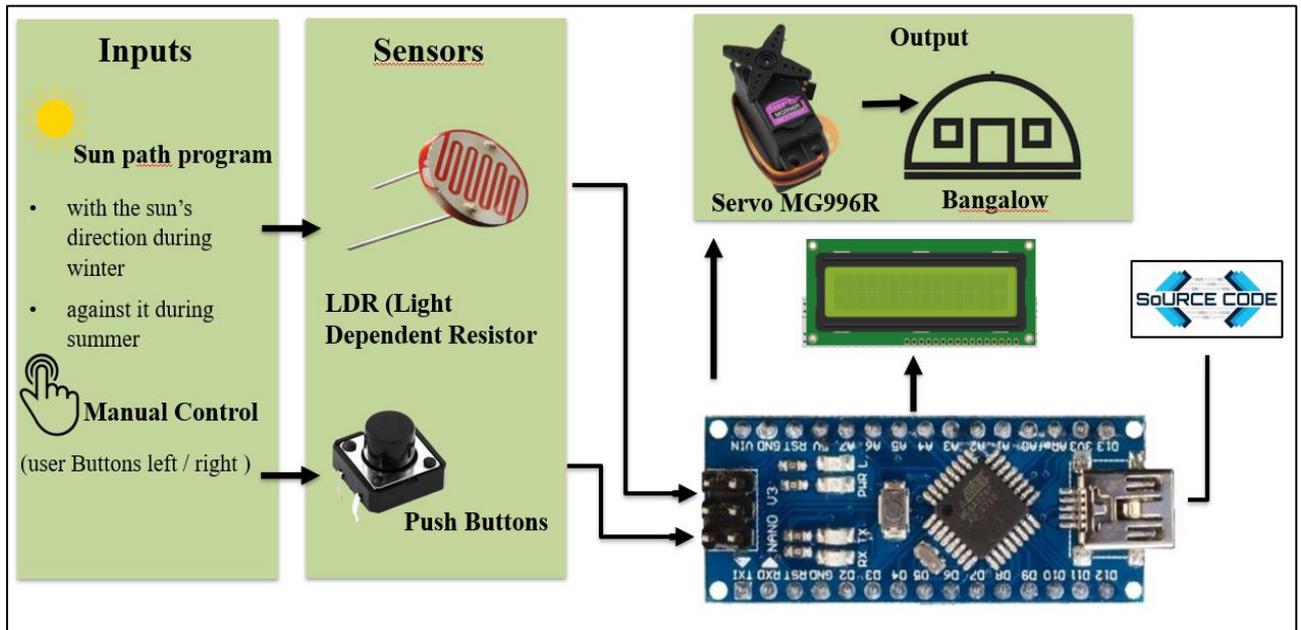


Figure 02: Schematic of a bungalow rotation system controlled by Arduino with sun tracking and manual inputs.
Source : Author

VI.2.6 Programming Logic :

- The Arduino Nano is programmed to rotate the base according to seasonal solar data.
- Uses hard-coded sun path data corresponding to each month.
- The logic distinguishes between summer mode and winter mode, and rotates the model accordingly (clockwise or counterclockwise).
- LCD displays current status: manual/auto state.
- Push buttons allow:
 - Manual rotation right
 - Manual rotation left
 - Automatic mode
 - Manual mode

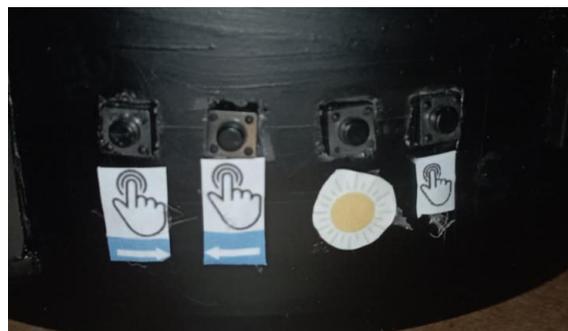


Figure 03 : Mode selection Buttons
Source : Author

VI.2.7 Prototype building:

A physical prototype was developed to simulate the behavior of the rotating bungalow system on a reduced scale. The objective of this prototype is to validate the rotational logic, test manual and programmed control, and simulate the mechanical behavior of the structure. The construction process followed the steps below:

A. Base Structure Construction (Rotational Platform):

The prototype begins with the construction of a hollow circular base . This base acts as a support platform for all electrical components and serves as the foundation for the rotation system.



Figure 04 : Rotational Platform
Source : Author



Figure 05 : Integration of the components within the base platform
Source : Author



Figure 06 : Assembly of the rotating base structure
Source : Author



Figure 07: A central axis pin was installed to simulate the main rotation axis, allowing smooth rotational support.

Source : Author

B. Dome Superstructure Installation:



Figure 08: On top of the rotational base, a lightweight dome-shaped structure was installed.

Source : Author



Figure 09: Prototype
Source : Author

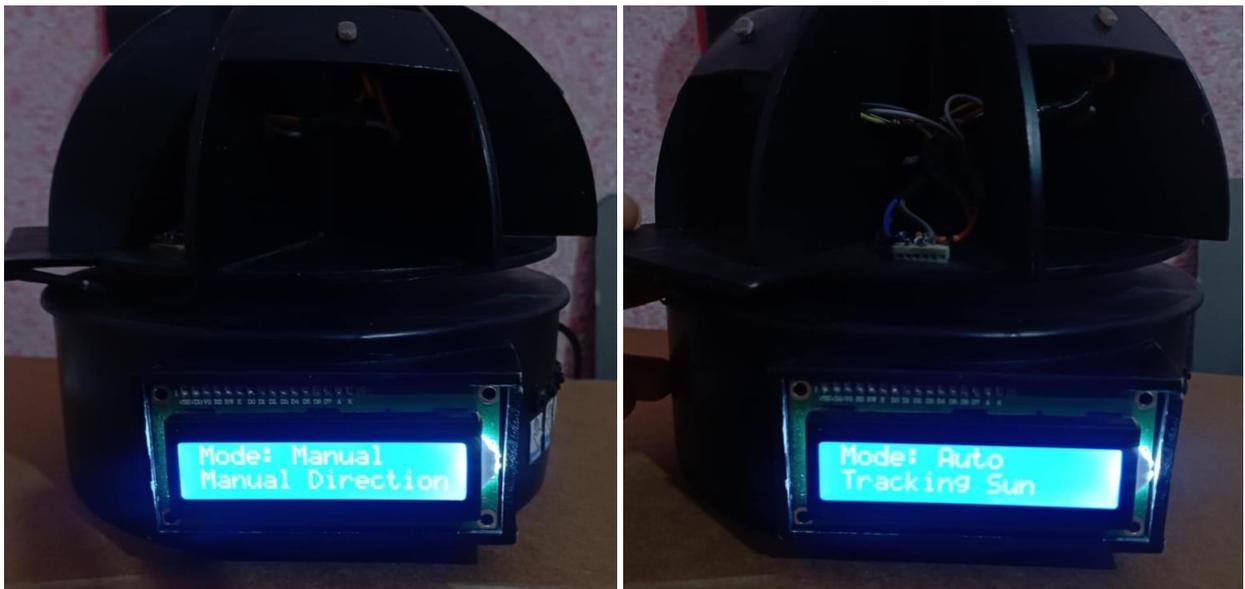


Figure 10: Manual / Automatic mode
Source : Author

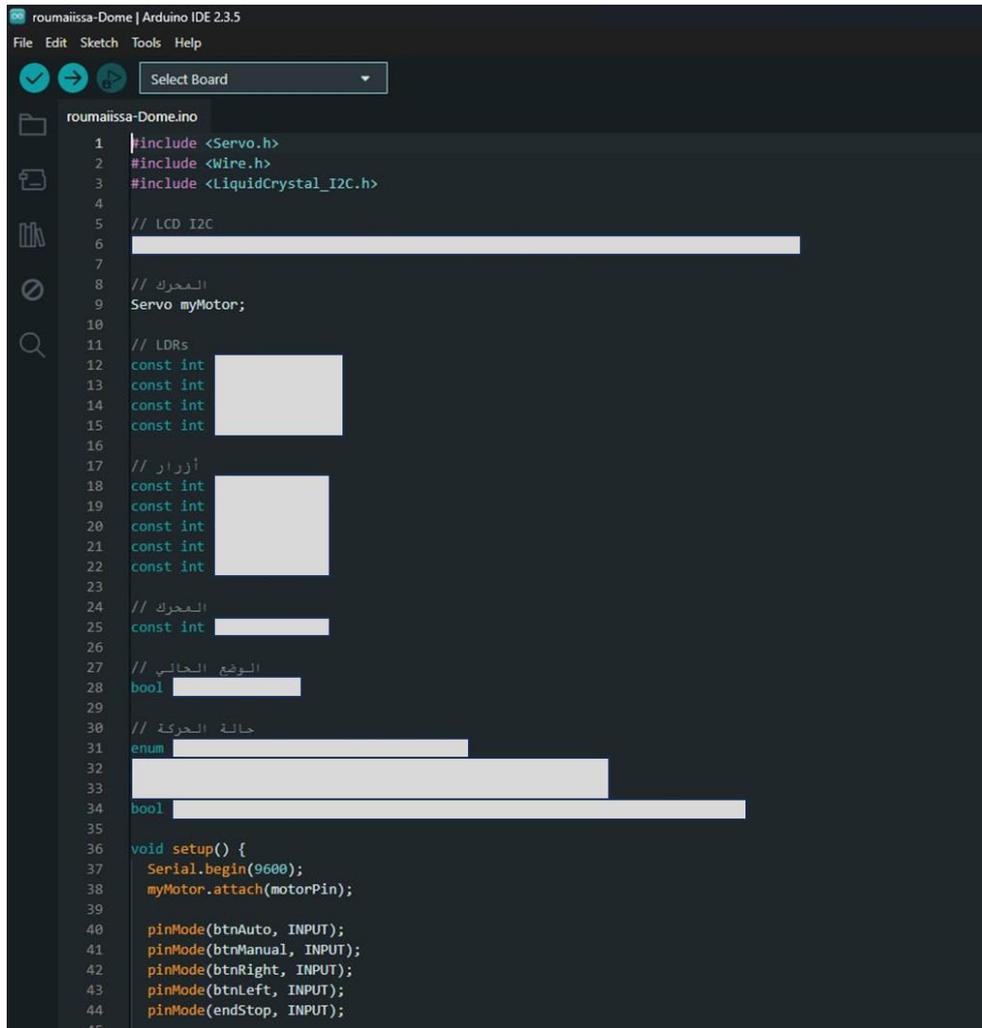


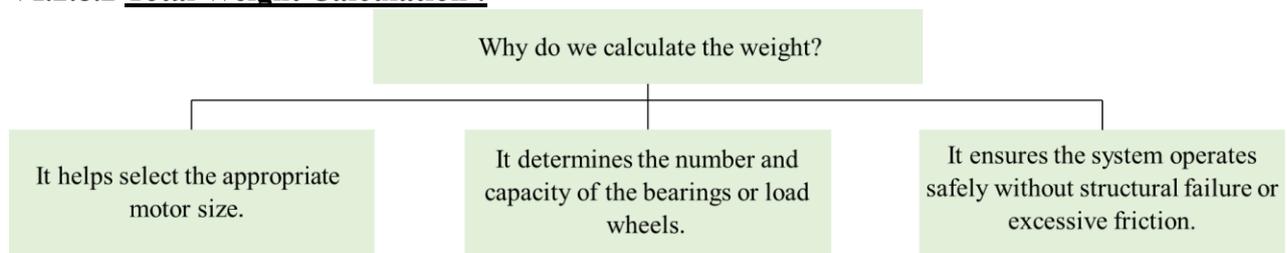
Figure 11: Uploading the source code through Arduino IDE
Source : Author

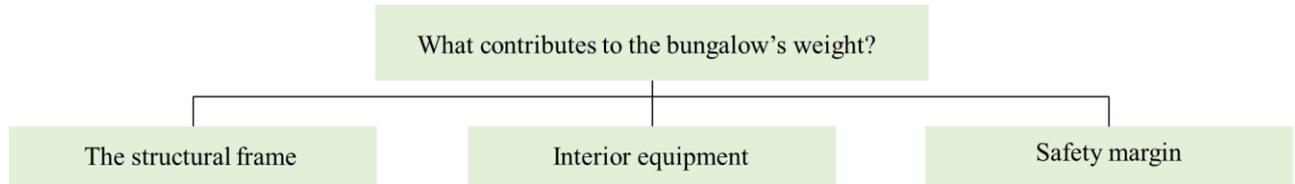
VI.2.8 Rotating Mechanism Estimation for the bangalow :

VI.2.8.1 General Information :

Type:	Single-floor wooden dome bungalow
Total Floor Area:	167 m ²
Structure:	Lightweight wood frame with insulation and glazing
Base:	Circular base fixed on a concrete slab
Rotation Goal:	Full 360° rotation in 24 hours (sun-tracking, slow movement)

VI.2.8.2 Total Weight Calculation :

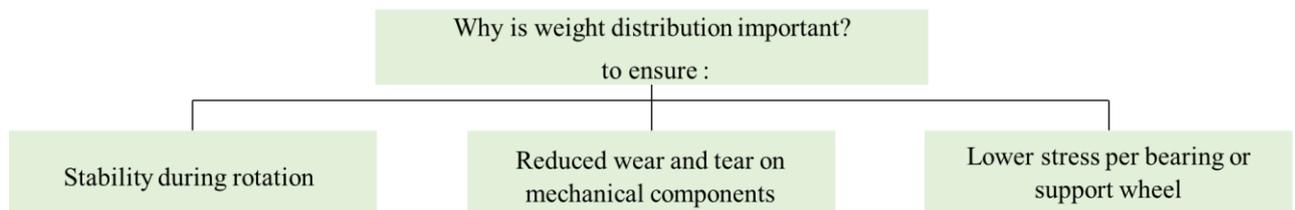




- Wooden walls + roof frame + flooring $\approx 350 \text{ kg/m}^2$
- Raw structural weight = $167 \times 350 = 58,450 \text{ kg} \approx 58.5 \text{ tons}$
- Interior equipment and furniture $\approx 5 \text{ tons}$
- Safety margin $\times 1.3 \Rightarrow (58.5 + 5) \times 1.3 \approx 82.5 \text{ tons}$

Final design weight basis = Approximately 83 tons

VI.2.8.3 Load Distribution :



- Using 6 rotational support points (bearings or rolling wheels):
- Load per point = $83 \div 6 \approx 13.8 \text{ tons per support}$
- Applying a $1.5\times$ safety factor: $13.8\text{tons} \times 1.5 = 20.7\text{tons}$
- Therefore, each support point should be rated for at least 20 tons.

VI.2.8.4 Motor and Drive System :

A. Why is this important?

After calculating the bungalow's weight and how it's distributed, we move to the core of the rotation system:

The motor that drives the bungalow, and the gearbox that reduces the motor's speed and increases torque.

B. parameters:

- Total weight of the bungalow: 83 tons
- Requirement: Very slow, smooth, safe motion without vibration.
- Required speed: $360^\circ \div 24 \text{ hours} = 15^\circ \text{ per hour}$

C. Comparing with Johnstone's Rotating House :

• **Johnstone's House:**

Weight: 272 tons

Motor: 1.5 HP DC motor

• **Bungalow:**

Weight: 83 tons $\approx 30\%$ of Johnstone's house

- Therefore, power requirement is roughly: $1.5\text{HP} \times 0.3 = 0.45\text{HP}$
- A 0.5 to 1 HP DC motor is more than sufficient

Since the bungalow will rotate only once per 24 hours, the motor’s speed must be reduced dramatically while maintaining high torque.

- The ideal solution:
 - A high-ratio gearbox, such as:
 - Worm Gear with a 1000:1 reduction ratio

D. Rotation Speed & Comfort :

- 1 full rotation = 360°
- Time = 24 hours = 1440 minutes

E. calculate the angular speed:

$360^{\circ} / 24 \text{ hours} = 15^{\circ} \text{ per hour}$

And the rotational speed in RPM (rotations per minute):

$1 \text{ rotation} / 1440 \text{ minutes} \approx 0.000694 \text{ RPM}$

So the system rotates at:

- Approximately 0.0007 RPM
- Or 1 degree every 4 minutes

This is an extremely slow rotation—so slow that people inside won’t feel it at all.

F. Central Swivel System (Utilities) :

A static central core (swivel) is required to maintain utility connections:

- Electrical cables
- Plumbing and wastewater pipes
- Internet and smart home system

VI.2.9 Smart Home Control Panel for Bungalow Rotation :

The rotating bungalow is equipped with a smart control system accessible through a Smart Home Control Panel or directly via smartphone using a QR code for quick pairing.

VI.2.9.1 Main Interface :

The first screen displays a 3D image of the bungalow with a small QR code on the side for self-control using a smartphone.

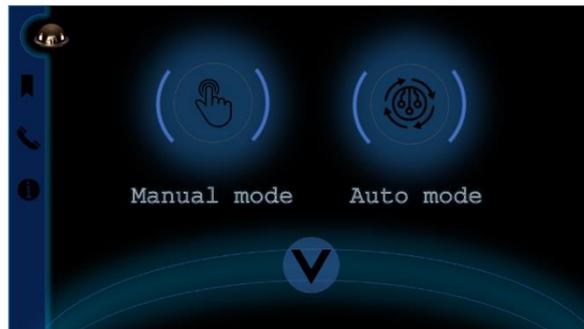


When the user taps on the bungalow image, a control options screen appears.

VI.2.9.2 Control Options Screen :

Two control modes are available:

- Manual Control
- Automatic Control



VI.2.9.3 Manual Control Mode :

- The user can choose the rotation direction (left or right).
- Real-time data is shown, including:
- Rotation speed (e.g., °/minute)
- Current rotation angle (°)
- Save Angle button : Allows user to save the current rotation angle to capture a preferred view



VI.2.9.4 Automatic Control Mode :

When selected, the bungalow begins to rotate automatically based on a pre-programmed solar tracking system.

The panel displays:

- Current rotate angle
- Rotation speed
- Save Angle also available: Even in automatic mode, users can pause and save a beautiful moment/view.



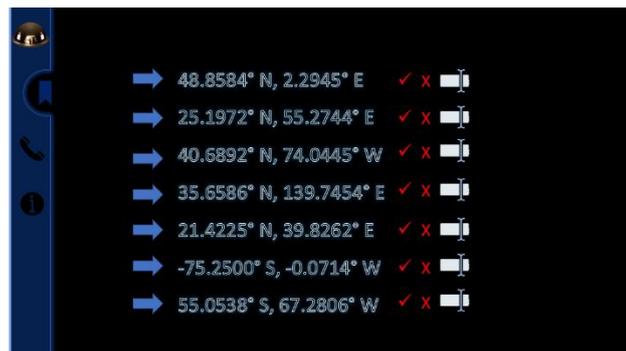
VI.2.9.5 Sidebar Menu (Always Visible) :



A **vertical sidebar** on the left side of the screen gives access to:

VI.2.9.6 Saved Angles Library :

- Quick list of all saved angles
- Tap to auto-rotate to that angle
- Rename or delete saved entrie



VI.2.9.7 Contact Info :

Technical support number/email/website

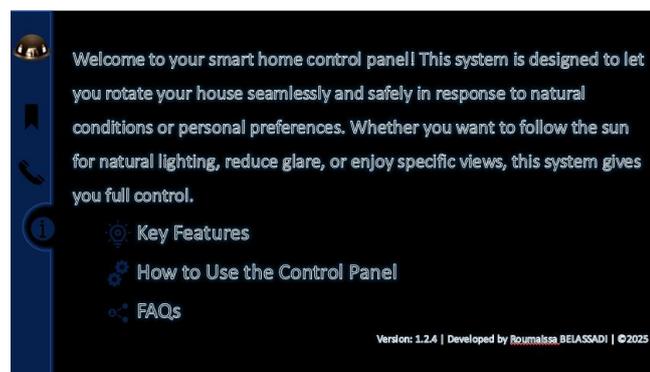


VI.2.9.8 Help & Support :

Key Features.

How-to instructions for using the panel.

FAQs (e.g., how to save angles, switch between modes, etc.).

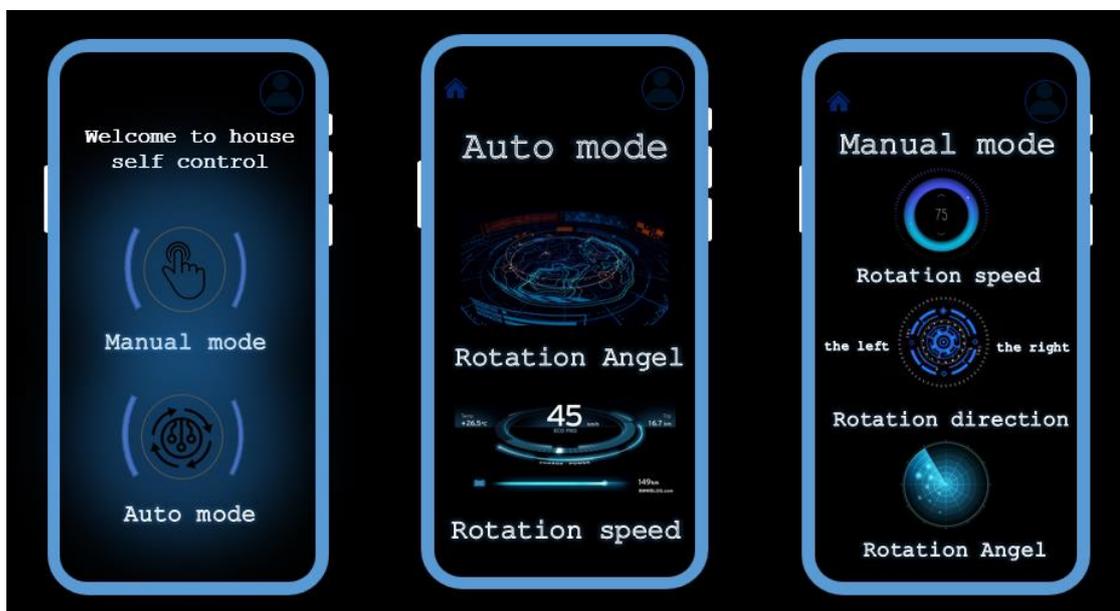


VI.2.9.9 Mobile Access via QR Code :

Once the user scans the QR code displayed on the main smart home panel, the bungalow rotation interface opens directly on their smartphone.

This remote interface mirrors the main panel and allows full control of the bungalow from anywhere inside the unit or nearby

Below are example screens showing how the application appears on a mobile device after scanning the QR code:



VI.3 Architectural part :

VI.3.1 Programmatic approach :

After analyzing different tourist villages and conducting extensive research, the following program was developed :

	Space	N	Area	T area
House 1	Bedroom	1	32 m ²	82 m ²
	Bathroom	1	15 m ²	
	Living room	1	20 m ²	
	Dressing room	1	15 m ²	
House 2	Bedroom	2	35 m ² / 25 m ²	116 m ²
	Bathroom	2	15 m ²	
	Living room	1	25 m ²	
	Dressing room	1	15 m ²	
	Kitchenette	1	16 m ²	
Reception	Reception area	1	120 m ²	295 m ²
	Waiting room	1	20 m ²	
	Luggage storage	1	30 m ²	
	Travel agency	1	25 m ²	
	Tourism information center	1	25 m ²	
	Femal /Male toilets	2	25 m ²	
	Patio	1	25 m ²	
Administration	Director's office	1	25 m ²	305 m ²
	Secretariat's office	1	20 m ²	
	Accounting administration	1	25 m ²	
	Meeting room	1	50 m ²	
	Management office	1	25 m ²	
	Head of service office	1	20 m ²	
	Store	1	40 m ²	
	Femal /Male toilets	2	25 m ²	
	Waiting room	1	25 m ²	
	Patio	1	25 m ²	
Spa	Reception	1	30 m ²	220 m ²
	Consulting area	1	16 m ²	
	Sauna	2	10 m ²	
	Massages room and skincare	2	16 m ²	
	Jaccuzzi	2	20 m ²	
	Changing rooms and bath rooms	2	25 m ²	
Gym	Reception	1	30 m ²	490 m ²
	Office	1	25 m ²	
	Changing room	2	30 m ²	
	TW	2	25 m ²	
	Storage	1	50 m ²	
	Staff facilities	1	30 m ²	

	Studio	1	100 m ²	
	Gym area	2	100 m ²	
Restaurant & swimming pool	Indoor setting	1	100 m ²	525 m ²
	Outdoor setting	1	100 m ²	
	Kitchen	1	100 m ²	
	Store	1	50 m ²	
	Walk in cooler	1	50 m ²	
	Femal /Male toilets	2	25 m ²	
Total area				1997 m²

VI.3.2 Conceptual approach :

VI.3.2.1 Idea :

The idea behind this tourist village is to create a calm and eco-friendly place where light and nature shape the experience. My vision is to design dome-shaped bungalows that rotate with or against the sun, offering comfort and natural views. Other spaces use soft, organic forms inspired by the hills and landscapes around the site. It's a peaceful escape where design, light, and nature live in harmony.

VI.3.2.2 Objectives and Intentions :

Objectives	Intentions
<ul style="list-style-type: none"> - Design an eco-friendly project that respects nature and reduces environmental impact. - Use organic architecture to follow the natural shapes of the site (no sharp or geometric lines). - Preserve natural elements of the site such as palm trees, water sources, and natural views. - Incorporate traditional architecture, like patios and buildings that go deeper into the ground. - Create a functional layout with two main parts: <ul style="list-style-type: none"> - A public area for visitors (restaurant, gym, etc.) - A private area for residents (living spaces). - Focus on user comfort and experience, whether they are residents or tourists 	<ul style="list-style-type: none"> - Respect the land by designing with the terrain, not against it. - Blend architecture with nature, not dominate it. - Use local and natural materials where possible. - Create a peaceful and immersive space, where people can relax and connect with the environment. - Celebrate cultural identity through traditional design elements. - Make the project sustainable, both environmentally and socially.

VI.3.2.3 Concept design :

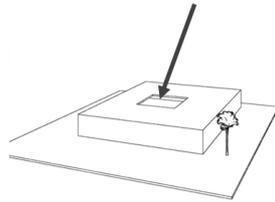
Design an eco-friendly tourist village.

Use organic forms – no strict geometric rules, only soft and natural shapes

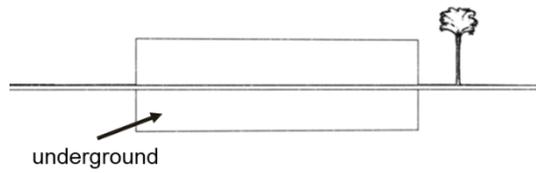
- Respect and use the natural features of the site: palm trees
- water
- beautiful landscape

Inspired by traditional local architecture:

- use of patio

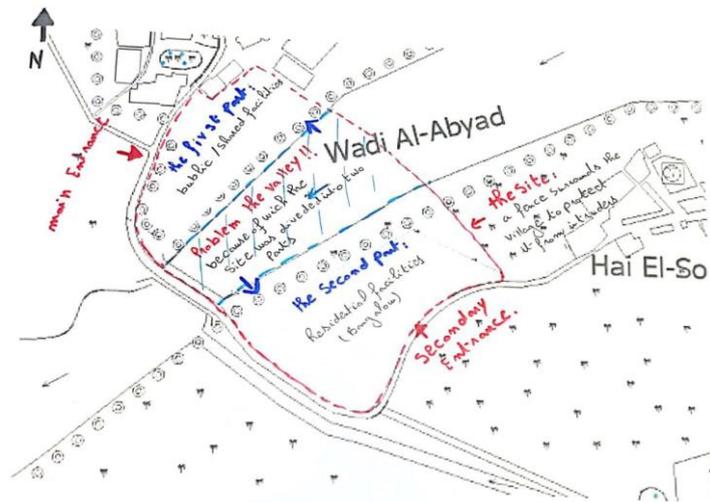


- build partly underground or lower to the ground for better thermal comfort.



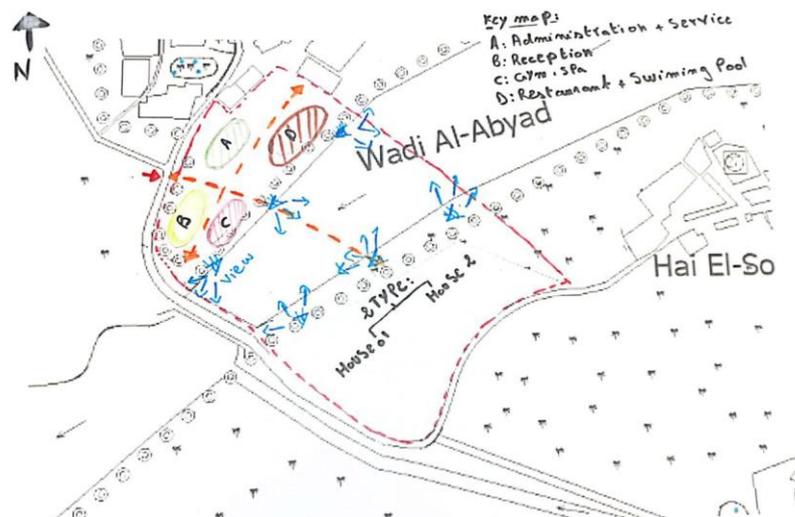
A. First step:

the site was analyzed and the main and secondary entrances were defined.

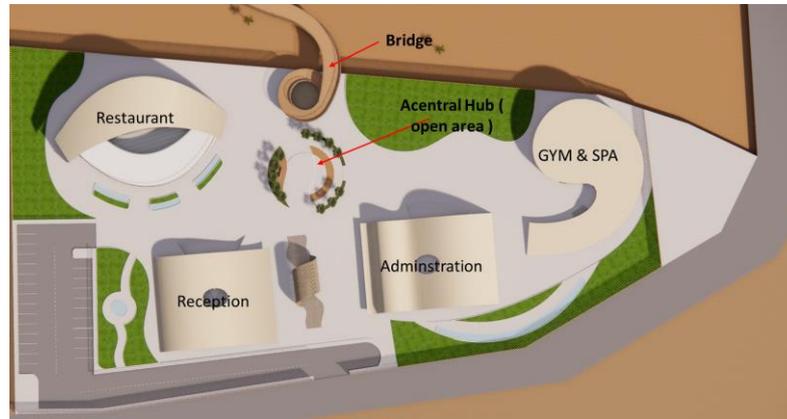


B. second step:

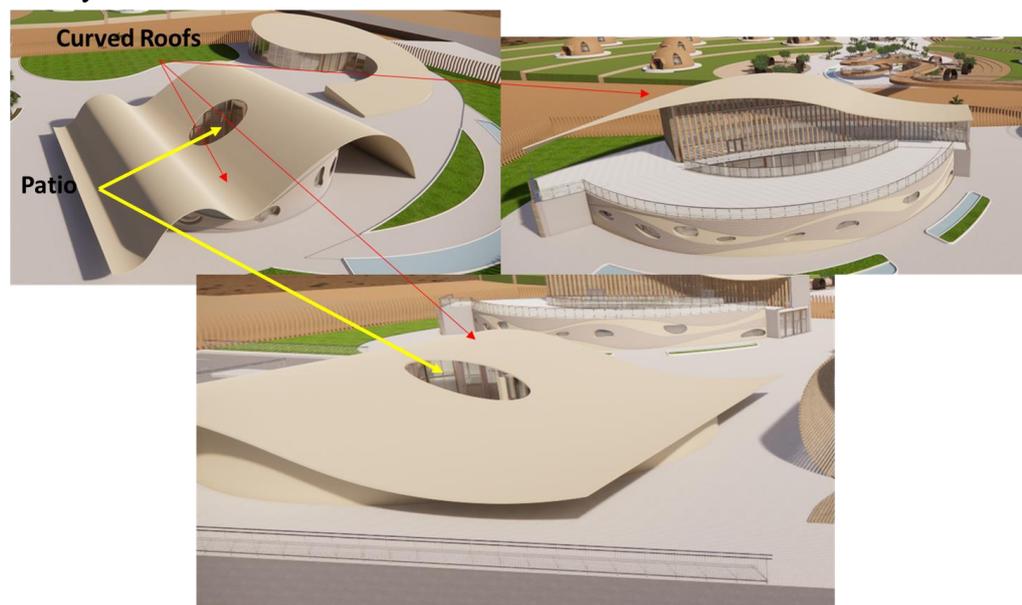
- the units were distributed into two zones: one for shared activities like the restaurant , spa, Gym
- and another for residential units, oriented toward the natural landscapes.



- The first part of the site is dedicated to public facilities and shared spaces.
- A central open area connects the main buildings: the restaurant, reception, administration, gym, and spa. Architecturally, it acts as a gathering point and a visual connector, enhancing the sense of orientation and openness.
- This central hub also leads to a bridge that connects to the second part of the site.

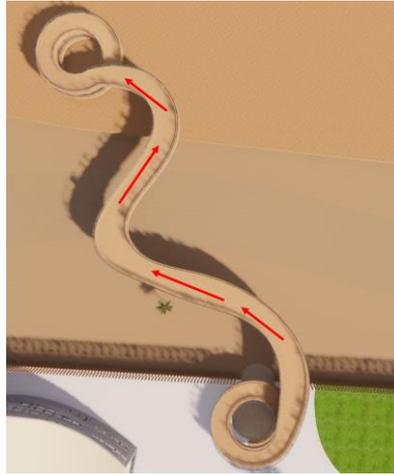


- The architectural forms of the public buildings feature organic, curved roofs inspired by nature.
- The patio concept, drawn from the traditional village design, is applied to create calm, shaded courtyards.

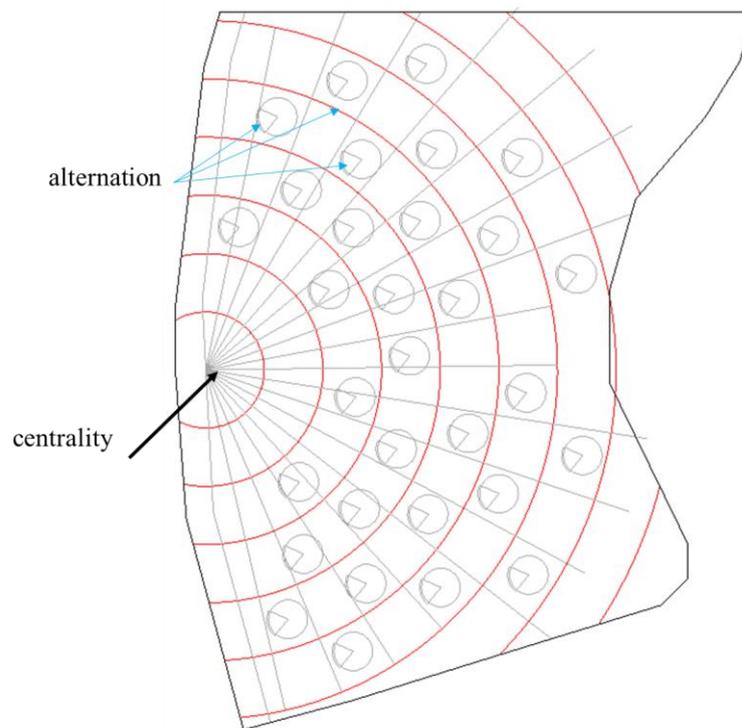


- All buildings in this area are partially sunken into the ground by one meter or more, depending on the function. This underground integration reflects the traditional construction methods of the local people and enhances thermal comfort.
- Due to the presence of a wadi that runs through the middle of the site and divides the project into two parts, a solution was designed in case the water level rises. The bridge connecting the two sides was raised to 5 meters to stay above the wadi during water flow. The path to the bridge goes up in a spiral shape along the edges, and the middle part of the bridge has an organic form that creates promenade and a variety of visual sequences.

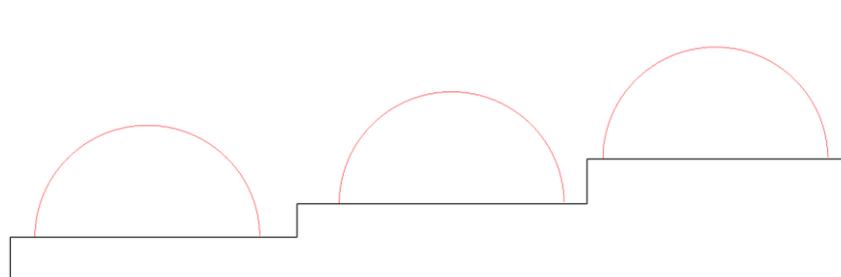




- The concept for the second part of the village, dedicated to the bungalows, includes three architectural concepts: centrality and alternation and gradation.
- On the horizontal level, the concepts of centrality and alternation between the bungalows were applied.

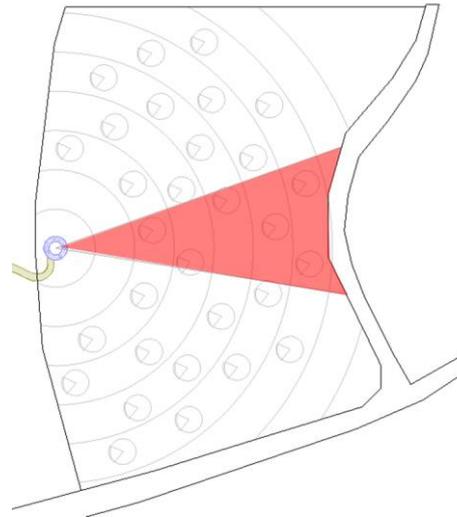


- On the vertical level, the concept of gradation was used.

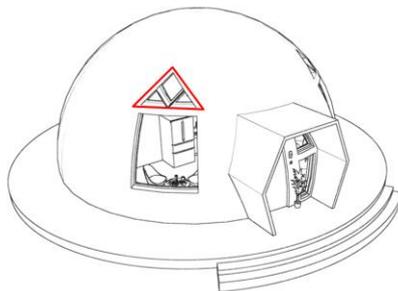


- The bungalows are distributed horizontally on the ground in an alternating pattern, radiating from a central point and following the rays that emanate from it. Vertically, the height of the bungalows increases as they move away from the central point in order to maximize the external views.

- After carefully placing all the bungalows to ensure that none of them block the natural views for others, the central area between them was dedicated to recreational spaces. This layout was designed to provide comfort and relaxation for the residents.



- The openings in the dome use triangular shapes, which are traditional symbols in M'Chouneche. These symbols are actually found at the entrance of the town, and were chosen to highlight the local identity and to honor the cultural heritage of the area.



VI.3.3 Project presentation :
Masse plan :

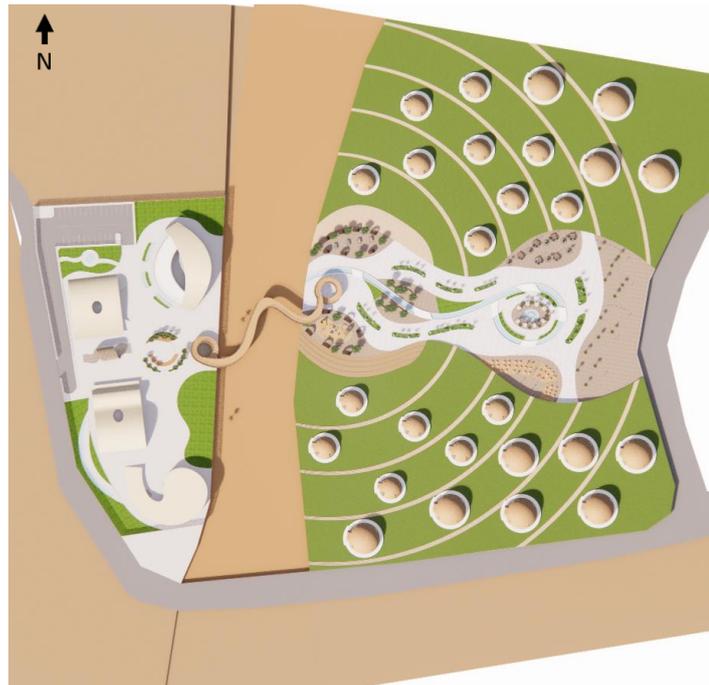


Figure 01: masse plan, scale 1/500
 Source : Author

Bangalow Type 1 layout , Sections , Elevations :

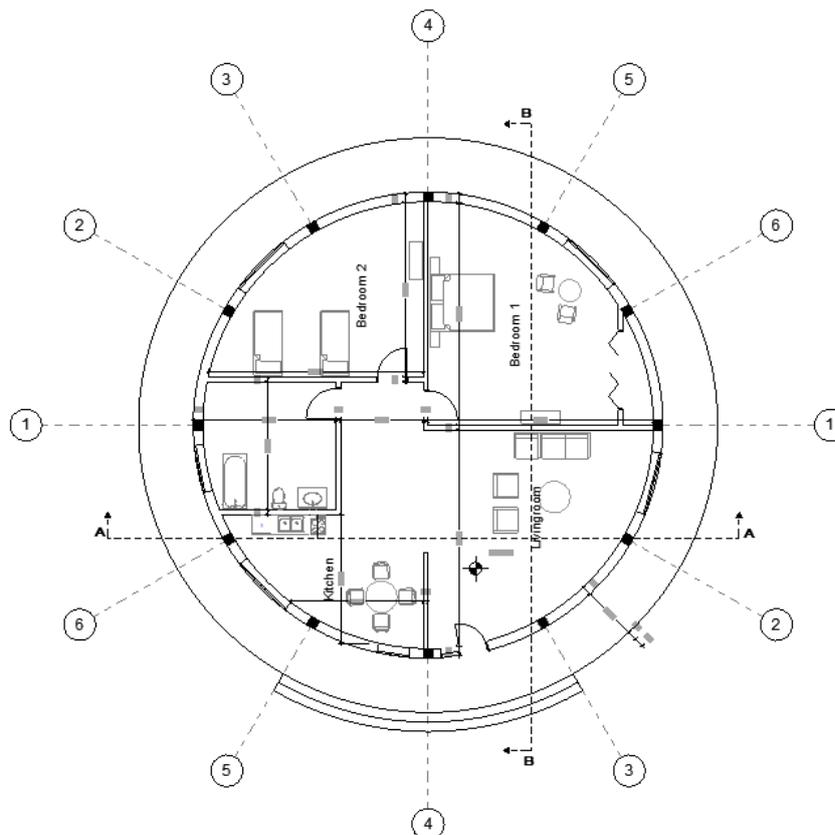


Figure 02: Ground floor layout , scale 1/100
 Source : Author

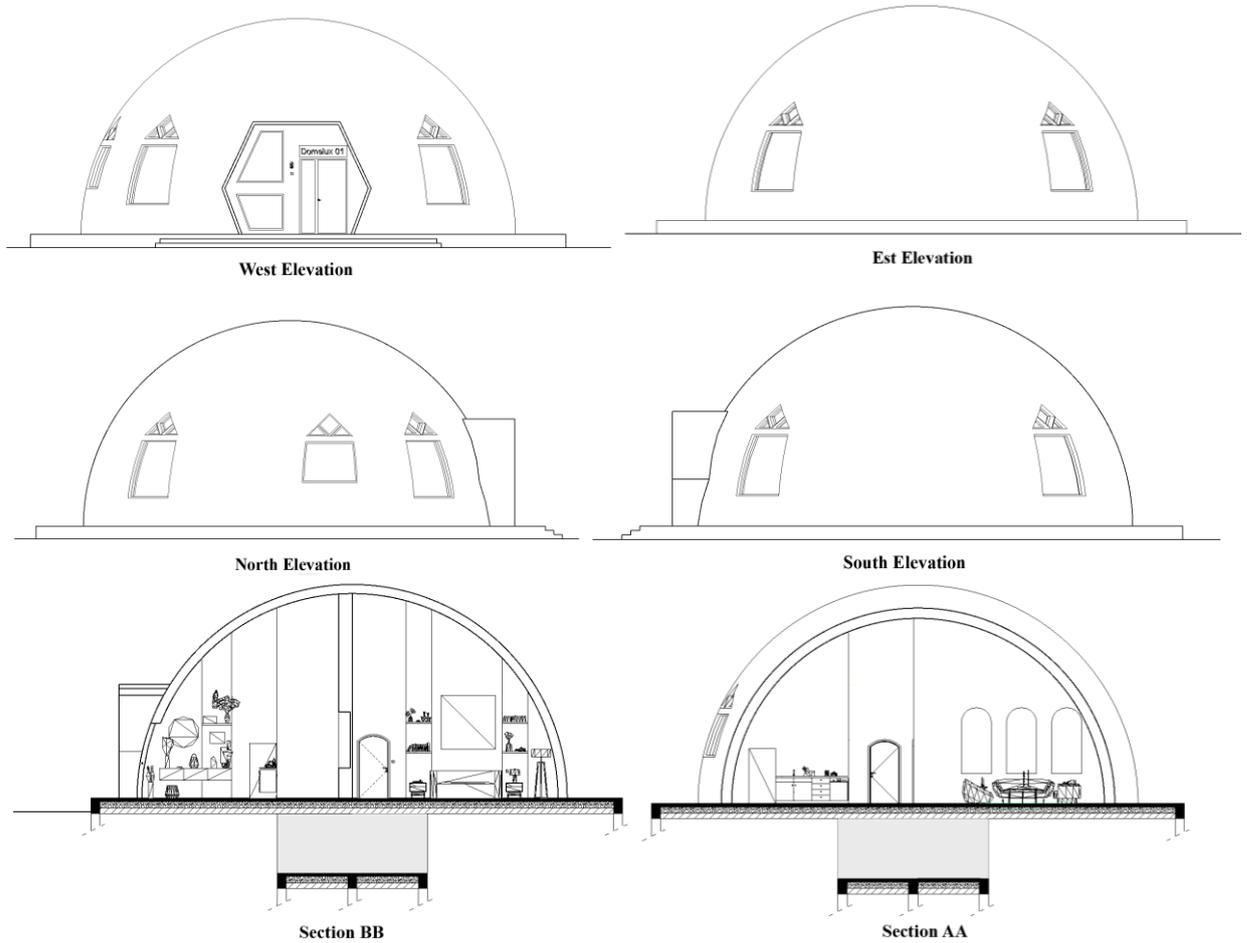


Figure 03: Bangalow's sections and elevation , scale 1/100
Source : Author

Bangalow Type 2 layout , Sections , Elevations :

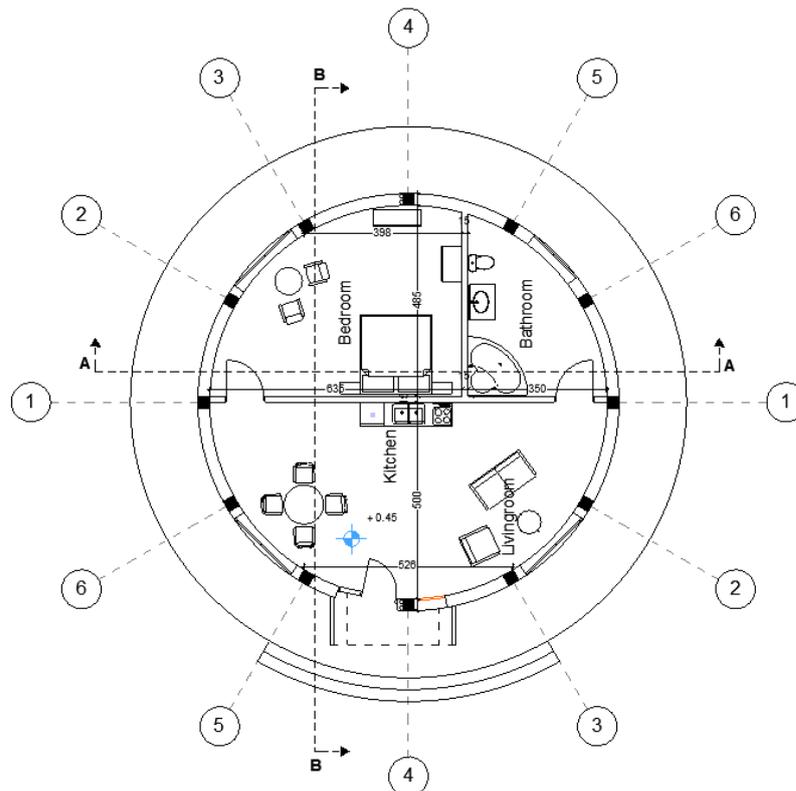


Figure 04: Ground floor layout, scale 1/100
Source : Author

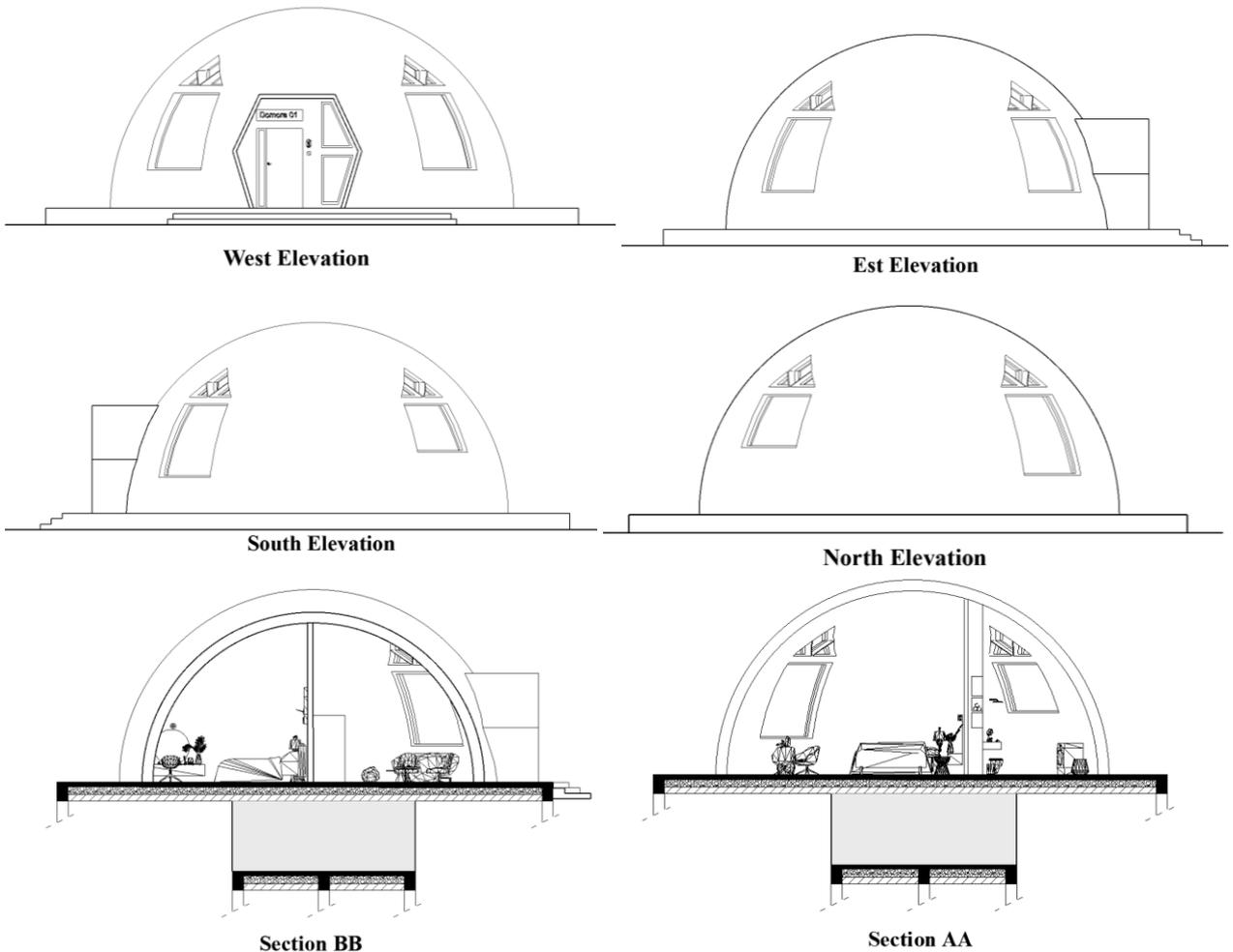


Figure 05: Bangalow's sections and elevation , scale 1/100
Source : Author

Restaurant Layout ,Sections , Elevations :

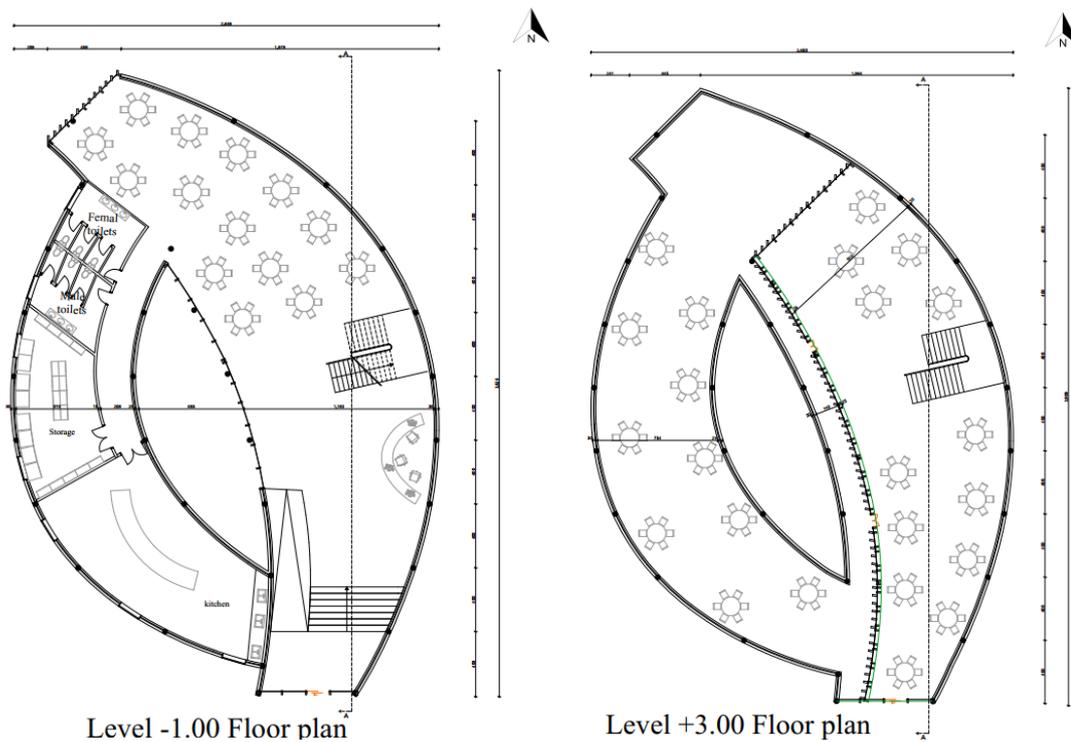
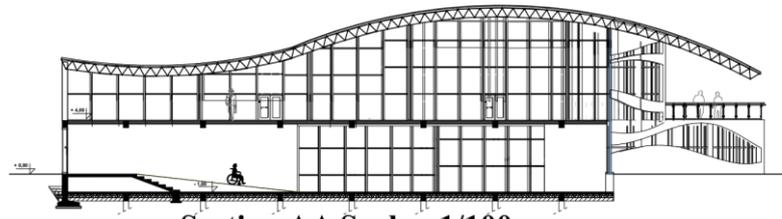


Figure 06: Restaurant Layouts , scale 1/100
Source : Author



Section AA Scale : 1/100

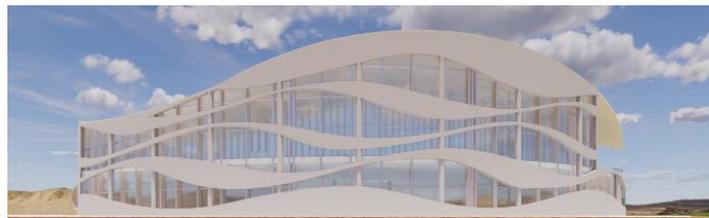
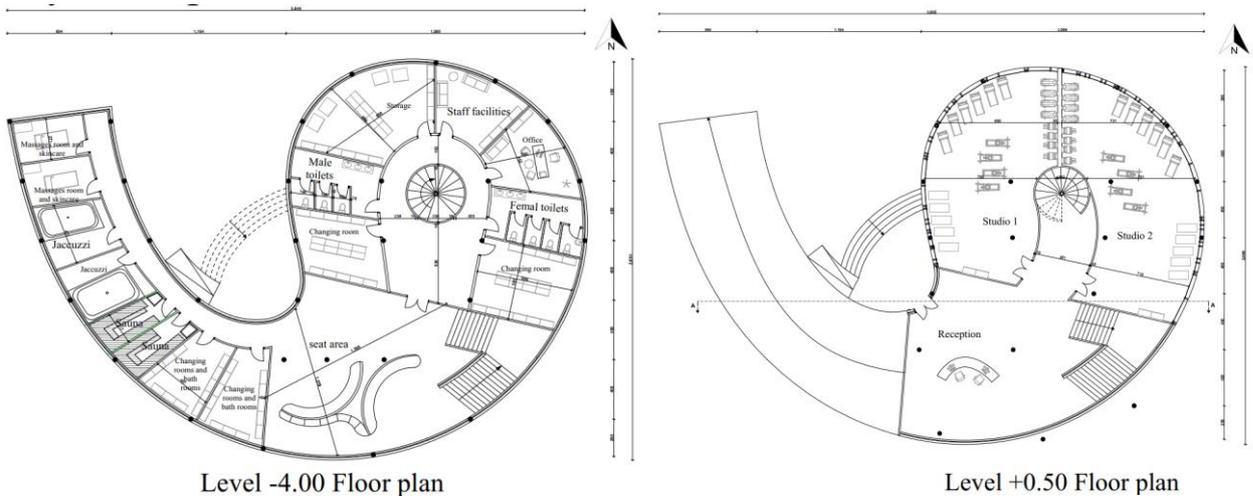


Figure 07: Restaurant sections and elevations , scale 1/100
Source : Author

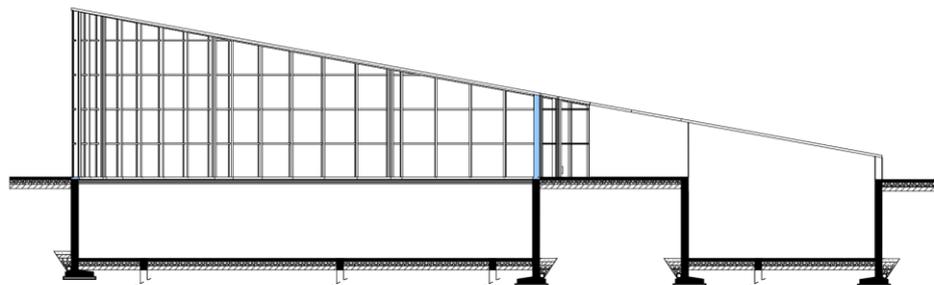
Gym and Spa layout :



Level -4.00 Floor plan

Level +0.50 Floor plan

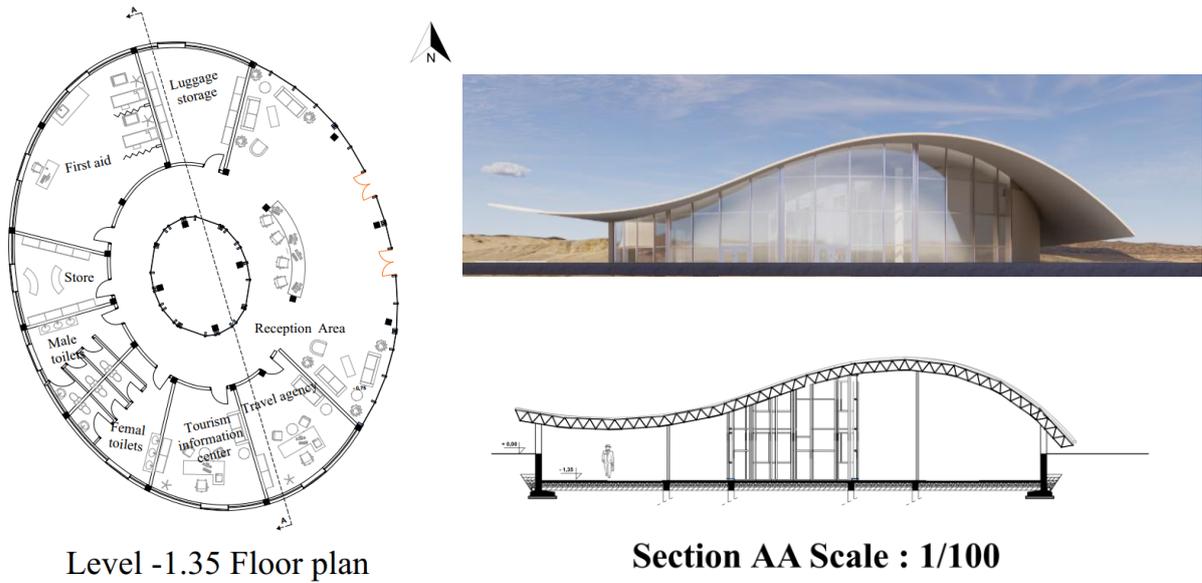
Figure 08: Gym and spa Layouts , scale 1/100
Source : Author



Section AA Scale : 1/100

Figure 09: Gym and spa section , scale 1/100
Source : Author

Reception layout, saction , elevation :

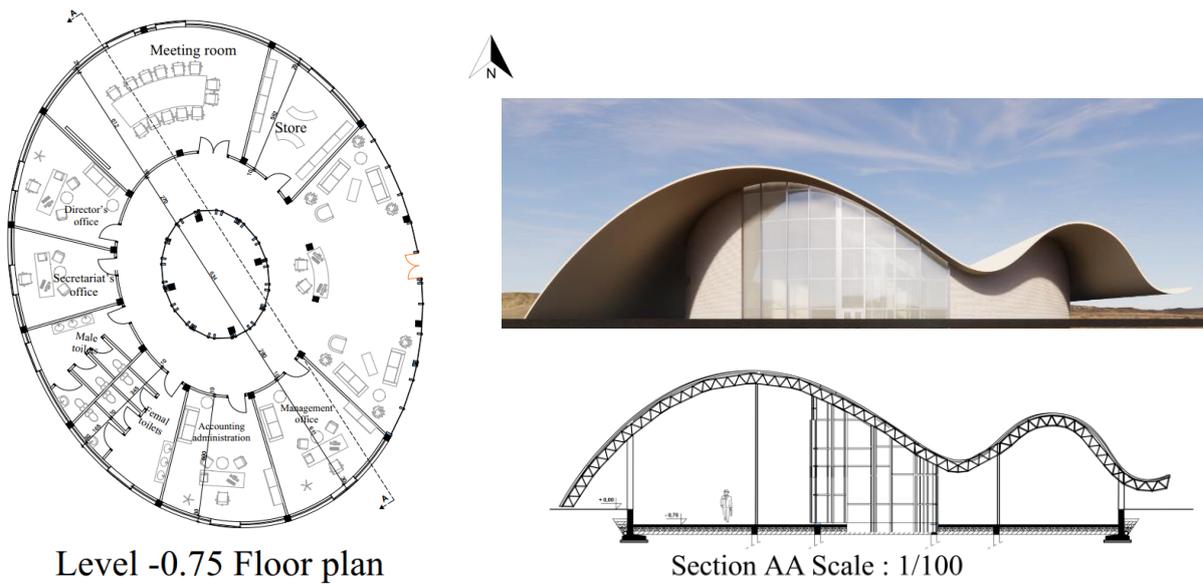


Level -1.35 Floor plan

Section AA Scale : 1/100

Figure 09: Reception layout, saction , elevation , scale 1/100
Source : Author

Administration layout , saction , elevation :

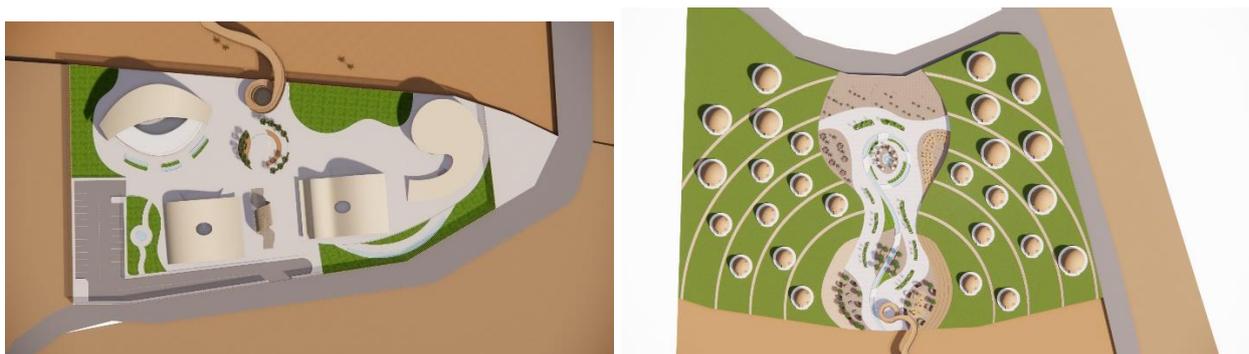


Level -0.75 Floor plan

Section AA Scale : 1/100

Figure 10 : Administration layout, saction , elevation , scale 1/100
Source : Author

Renders:





Conclusion

General conclusion :

Rotating houses represent a promising architectural innovation that responds to the growing need for sustainability and user comfort in the face of climate change and rising energy costs. By tracking the sun, maximizing natural lighting, and offering dynamic panoramic views, these structures redefine the relationship between architecture and nature, improving both energy performance and psychological well-being.

However, this concept also brings forth technical and engineering challenges that require an integrated approach combining architectural design, mechanical systems, and intelligent control technologies. To address these challenges, this study adopts an applied approach through the design and development of a rotating house prototype, inspired by the Domespace model. The prototype aims to test the effectiveness of the rotation mechanism and evaluate its impact on lighting, view quality, and environmental comfort.

This research also highlights the potential of rotating architecture in the context of eco-tourism, where such buildings can offer a unique living experience that blends technology with natural surroundings, fostering a stronger sense of place. In doing so, this thesis contributes to the advancement of sustainable architecture by bridging theoretical analysis with practical experimentation and opening new perspectives for flexible, future-oriented design solutions.

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Annex 01

Exemples Analysis :

Kona village :

Situation :

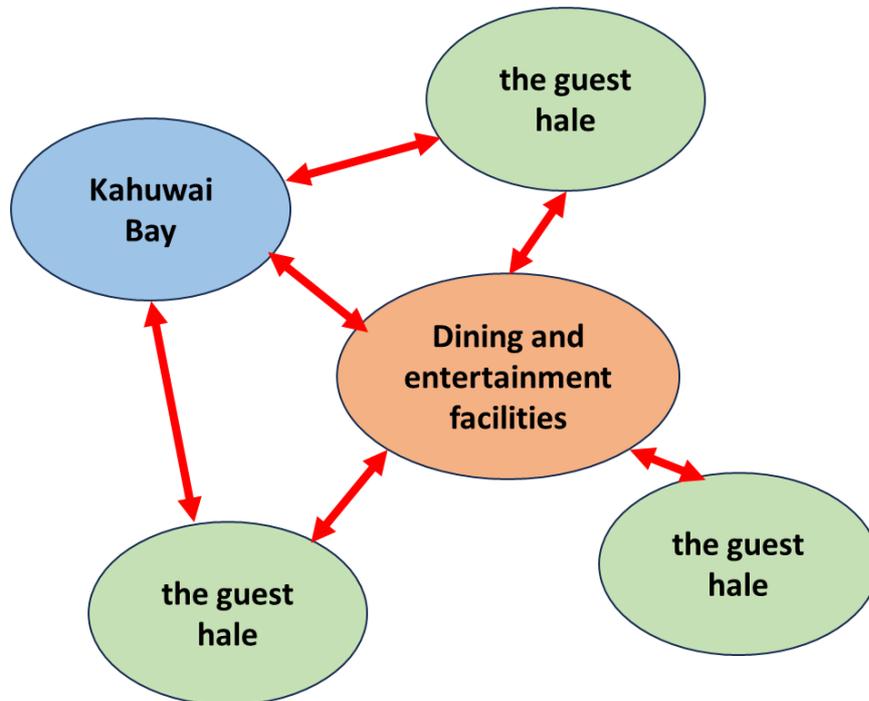


Distant environment of the project :



Master Planning and Layout :

- All facilities are designed to integrate seamlessly with the environment.
- Kona Village now offers 150 traditional guest hale, the new Asaya Spa, and five restaurants and bars, including the original resort's beloved Shipwreck and Talk Story bars.
- Dining and entertainment facilities are centrally located for easy access , set against the glistening waters of Kahuwai Bay.
- The resort is carefully planned to create a sense of community while maintaining privacy, while the guest hale arranged in small crescent-shaped clusters .
- each stand-alone guest hale is thoughtfully designed to capture views and emphasize privacy.
-

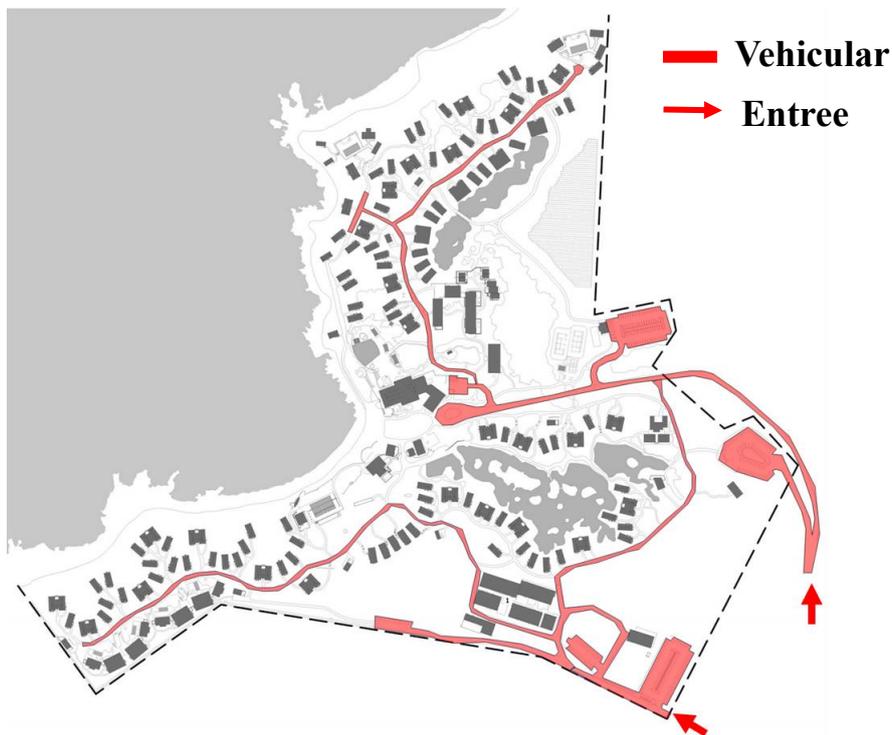


Legend :

1. Welcome hall
2. Moana Restaurant
3. Kahuwai cookhouse
4. kahuwai market
5. Moana pool & bar
6. Shipwreck pool & bar
7. Lap pool
8. Market
9. fitness centre
10. Asaya Spa
11. Tennis & pickleball
12. Guest parking
13. fish pond
14. hale ho'okpida parking
15. solar power field
16. Lagoon
17. signature suits
18. guest hale cove
19. Ohana suits
20. Talk story bar



Circulation and Connectivity :



Materials and color :

“We opted for materials that didn’t demand attention but rather quietly embraced the essence of the land.”Mike McCabe, Partner, Walker Warner

- The inspiration for the choice of materials was the coconut tree trunk.
- Structures are clad in recycled plastic thatch, rather than the native leaves the islanders previously relied upon. This sustainable approach protects the environment and enhances building durability.

- Hale interiors feature Douglas fir walls and ceilings and exposed wood framing- radiating warmth and brightness .

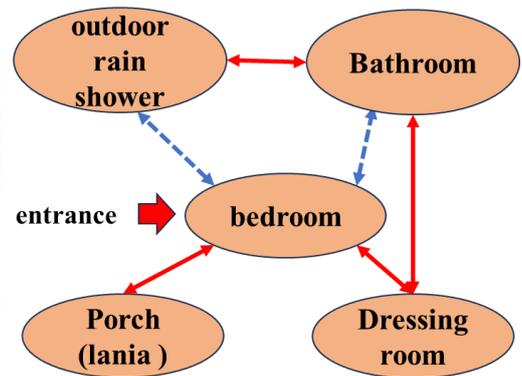
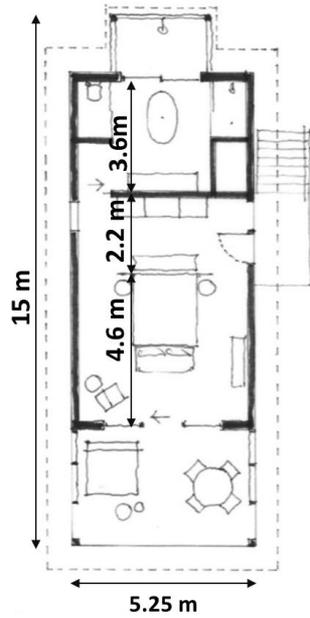


Spatial and functional organization :

Guest Hale :

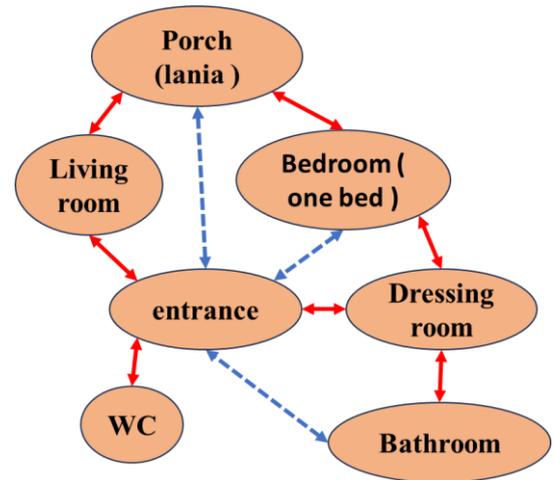


Rooms (Hale) :



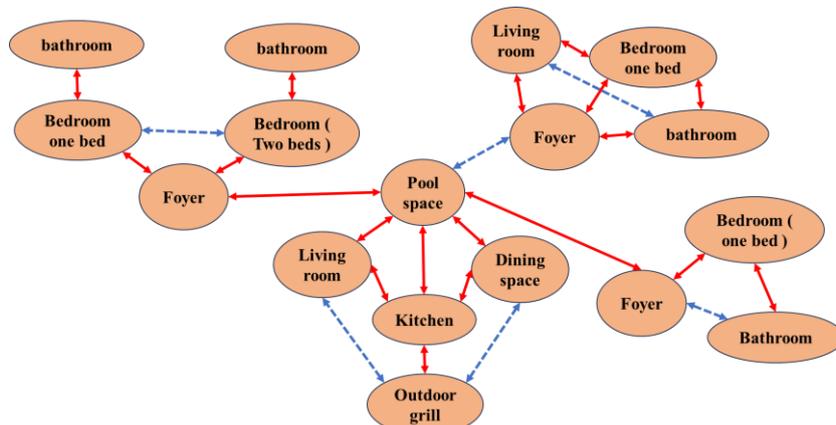
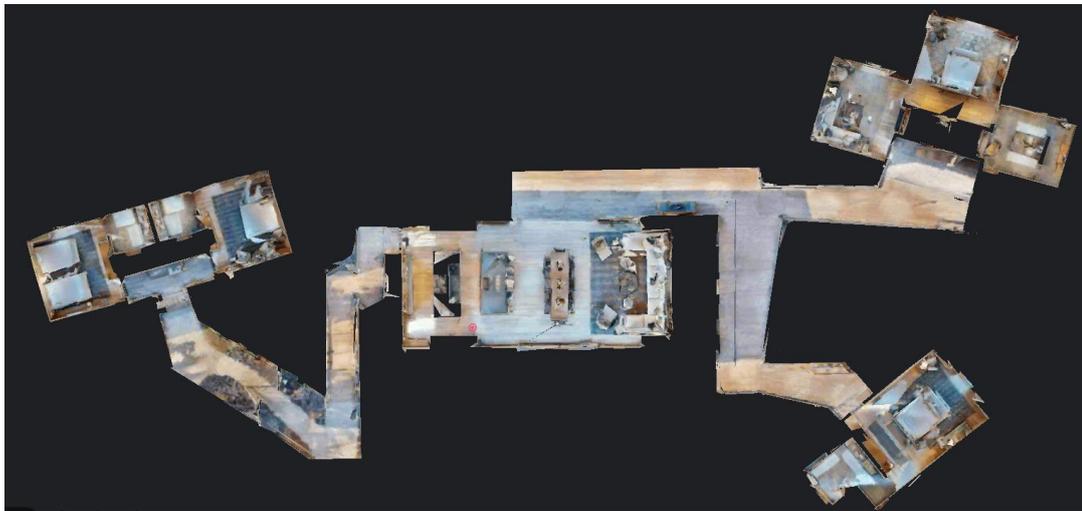
Suites (One bedroom Kauhale) :

- There are 37 suites (or kauhale one bed and two bed) in kona village
- Area : 149 m²
- Luxuriously appointed one bedroom suite situated throughout the resort with an oversized lanai, outdoor rain shower and one king bed

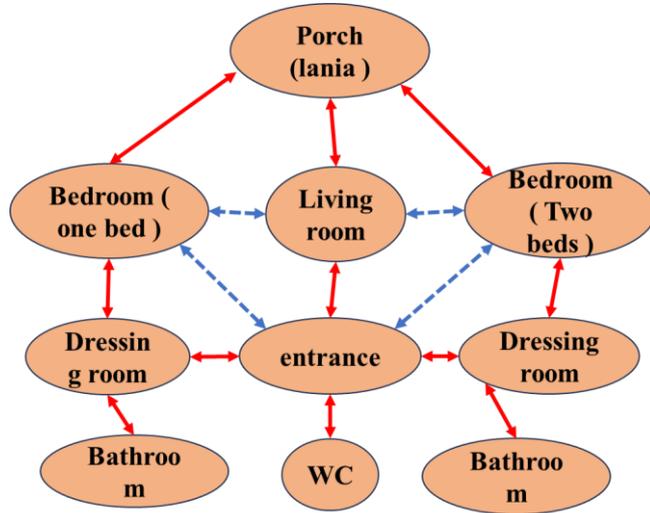


Suites (foor bedroom kumukea Kauhale) :

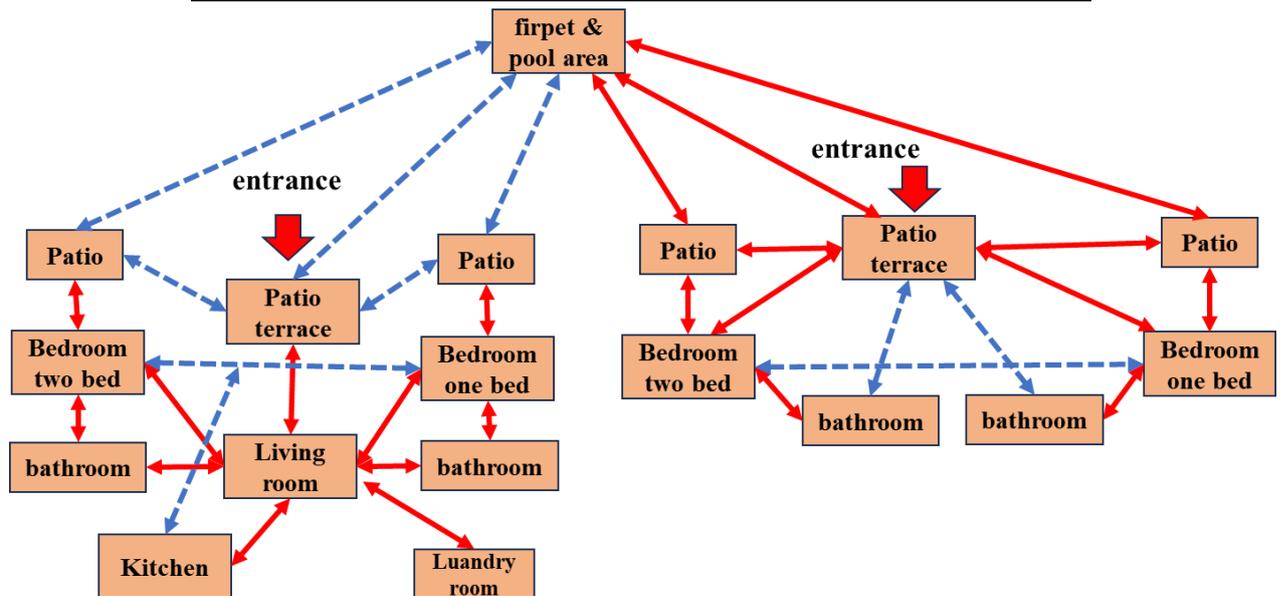
- Area : 497 m²
- Maheawalu Kauhale is a striking oceanfront residence, offering the ultimate retreat for groups traveling together, with four bedrooms and a central living space ideal for socializing and entertainment .



Suites (two bedroom Kauhale) :

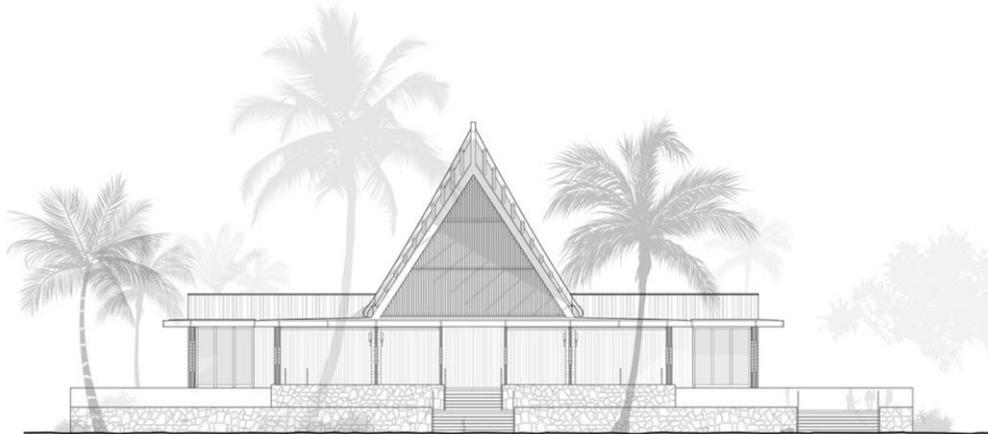
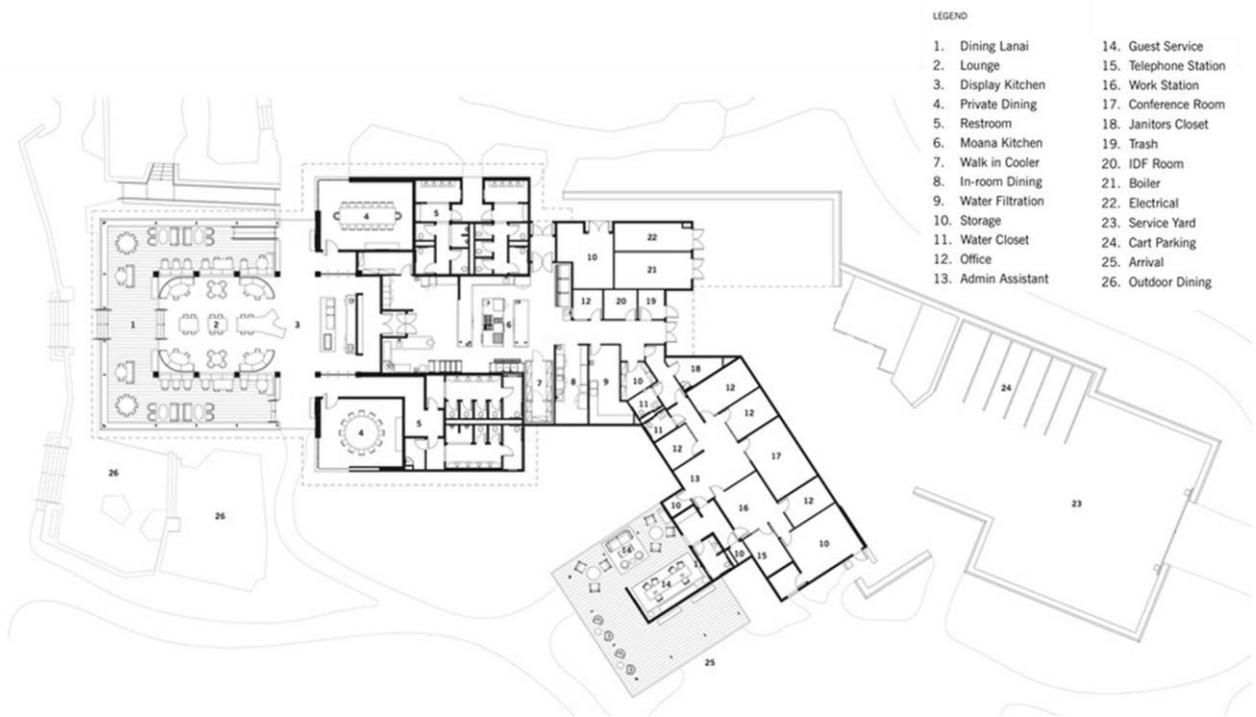


Suites (foor bedroom Kauhale) :



Moana Restaurant :

- It features a low-profile that respects the surrounding environment and traditional Hawaiian architecture.
- Moana, the signature restaurant, showcases a modern communal dining concept while reflecting the design of its predecessor.



➤ Moana restaurant's new design



➤ Moana restaurant's predecessor design

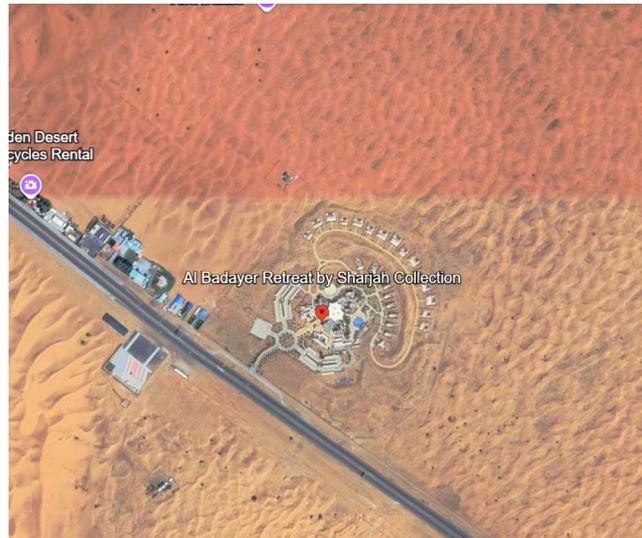


Features in kona village :

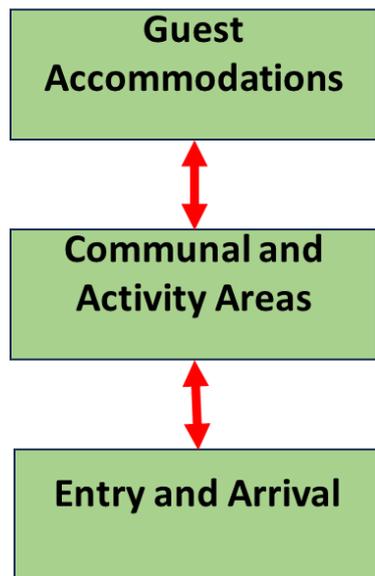
- The resort uses 100 percent solar energy and treats wastewater on-site.
- The project avoided unnecessary material waste through a partnership with ReUse Hawaii, which carefully deconstructed each of Kona Village’s 100-plus bungalows and salvaged usable materials, ultimately recycling 80 percent of the resort’s buildings and infrastructure.

Al-Bedayer Desert Camp

Situation :

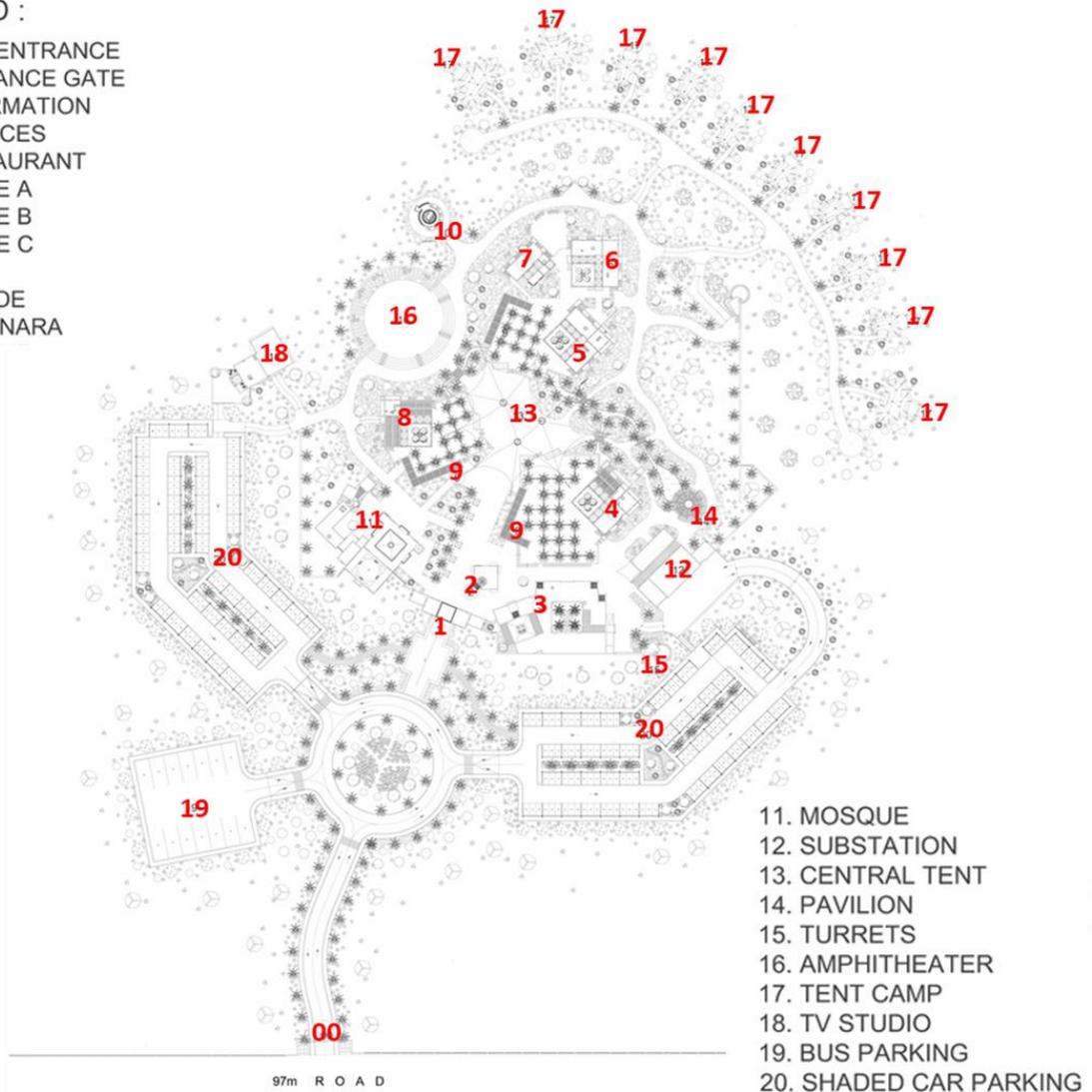


Master Planning and Layout :

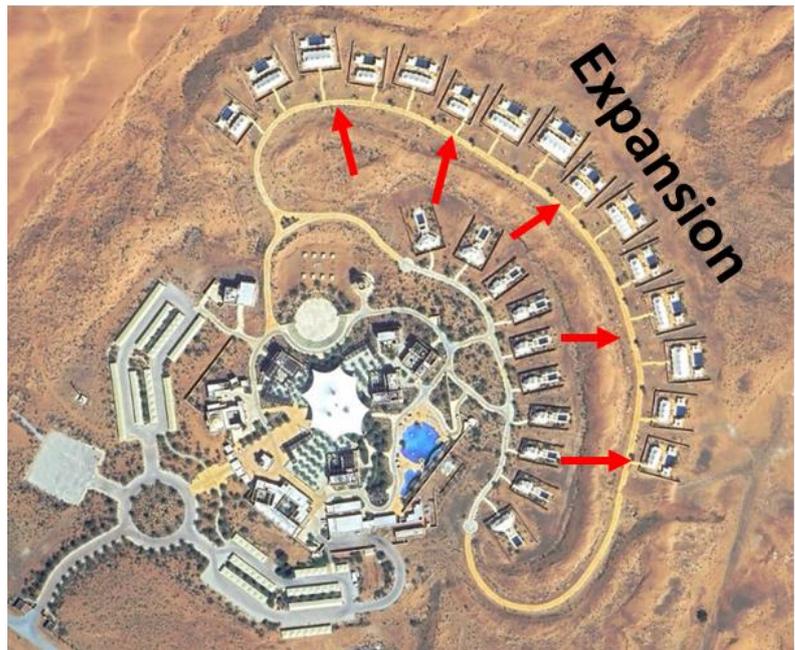


LEGEND :

- 00. MAIN ENTRANCE
- 01. ENTRANCE GATE
- 02. INFORMATION
- 03. SERVICES
- 04. RESTAURANT
- 05. LODGE A
- 06. LODGE B
- 07. LODGE C
- 08. CAFE
- 09. ARCADE
- 10. AL-MANARA



- The project includes 10 camping tents. Later, the project expanded to include an additional 15 tents.



Circulation and Connectivity :



- Vehicular Access**
- Entree**
- Pathways**

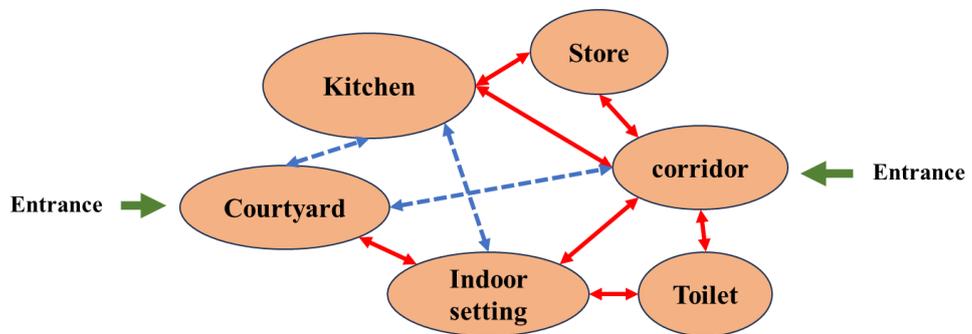
The design concept :

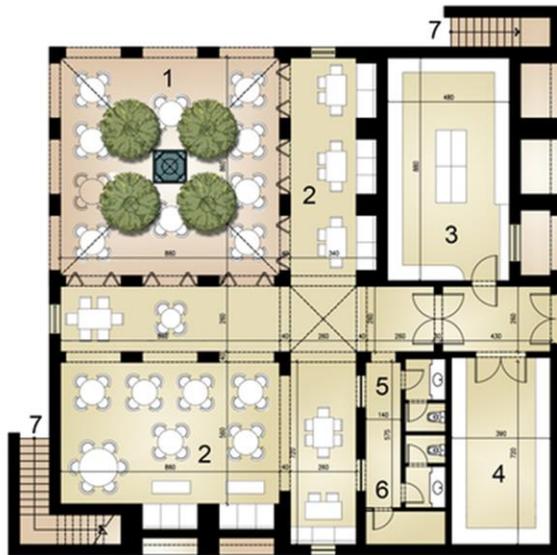
- The architectural style was inspired by the local traditional architecture. The biggest challenge was dealing with an open site in the heart of the desert without any direct constraints to help form the architectural idea. The question was: How and where do we start? These were the first steps of the design, and an attempt was made to distribute the buildings in a way that increases the interaction of the architecture with the natural environment
- The idea of an octagonal shape was used, connecting the different buildings of the project in its axes and sides in a way that preserves the interaction between them and nature, and in a geometric system in a semi-improvised or organic way. An attempt was made to draw inspiration from traditional architecture, incorporating elements such as courtyards, colonnades, livable roofs, and pergolas, to express the characteristics of the desert environment, including the interplay of shadow and light, which creates a striking symphony, and the buildings' color, which is considered the color of the desert: apricot. Additionally, the site layout reflects the nature of an oasis in the desert, with desert plants.



Spatial and functional organization :

The restaurant :

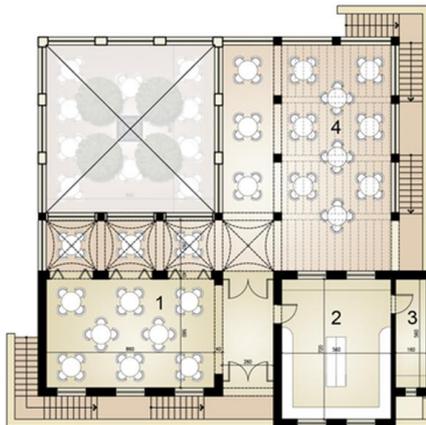




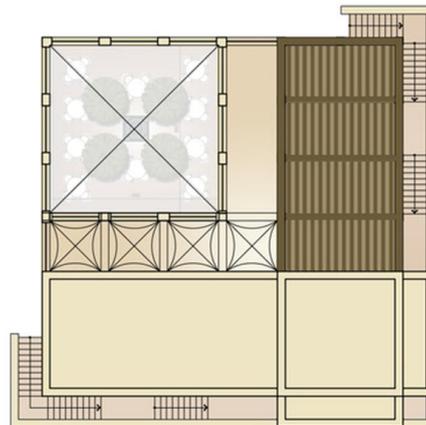
R - Restaurant

- 1. Courtyard
- 2. Indoor Sitting
- 3. Kitchen
- 4. Store
- 5. Male Toilets
- 6. Female Toilets
- 7. Stairs To First Floor

Ground Floor Plan



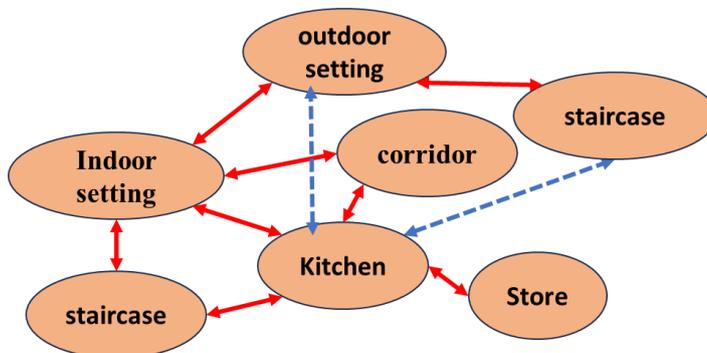
First Floor Plan



Roof Floor Plan

- 1. Indoor Sitting
- 2. Kitchen
- 3. Store
- 4. Outdoor Terrace

Total Net Area = 465 sqm.

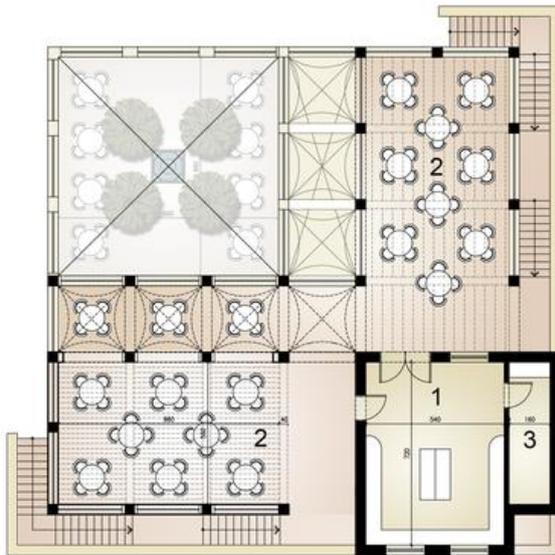




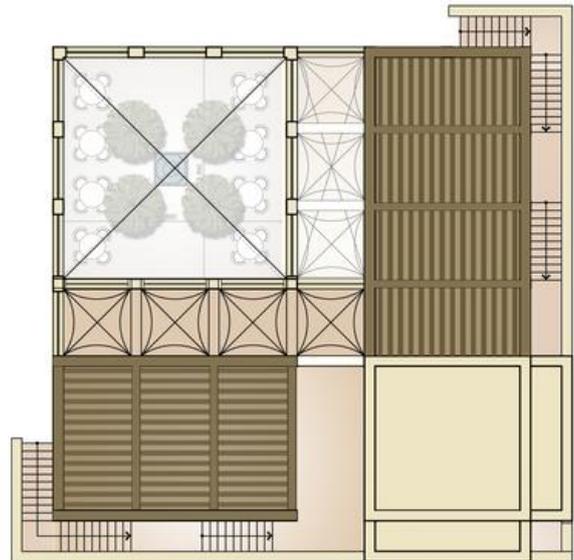
Ground Floor Plan

R - Restaurant

1. Courtyard
2. Indoor Sitting
3. Kitchen
4. Male Toilets
5. Female Toilets
6. Stairs To First Floor
7. Outdoor Sitting



First Floor Plan



Roof Floor Plan

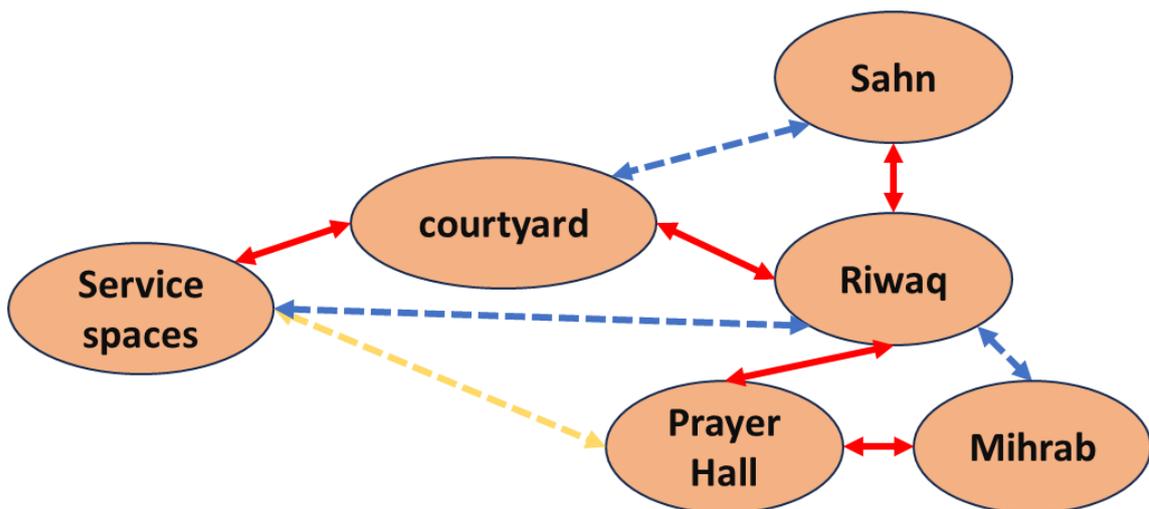
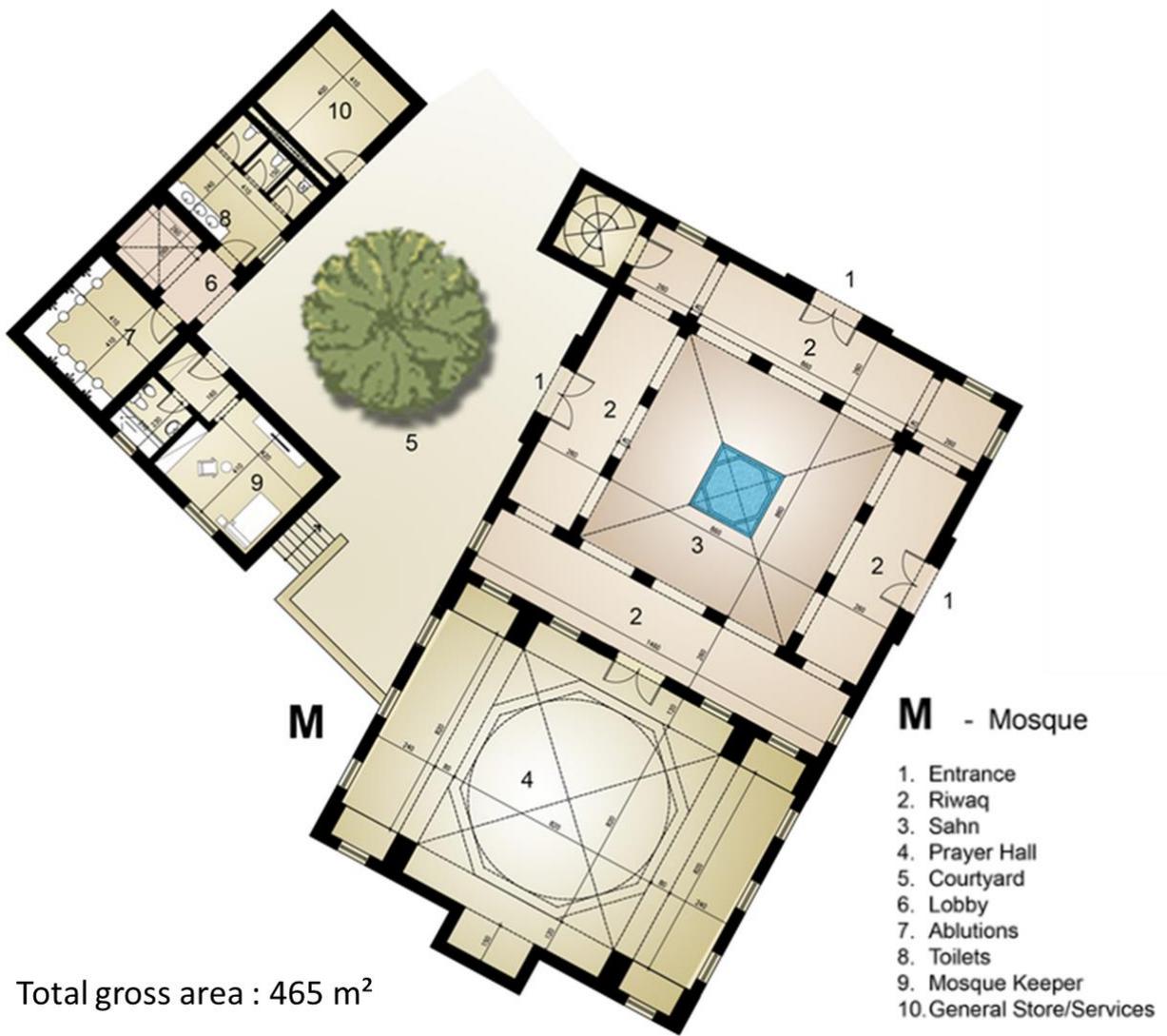
1. Kitchen
2. Outdoor Terrace
3. Store



Mosque :

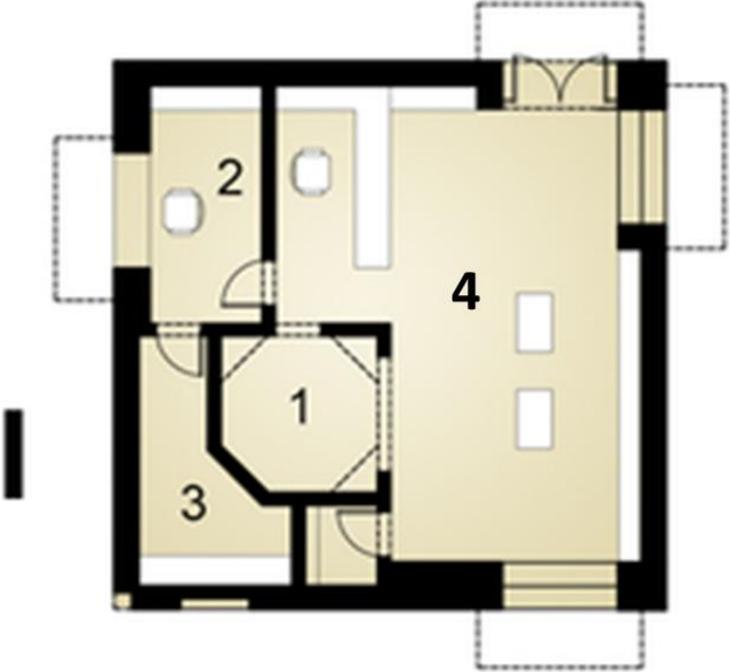




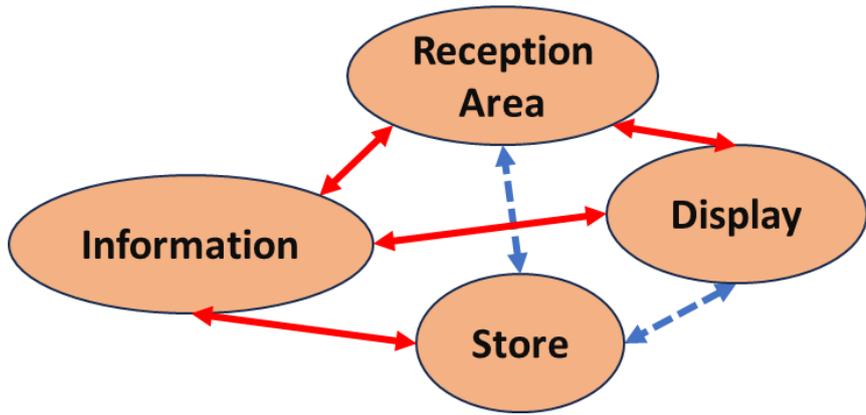




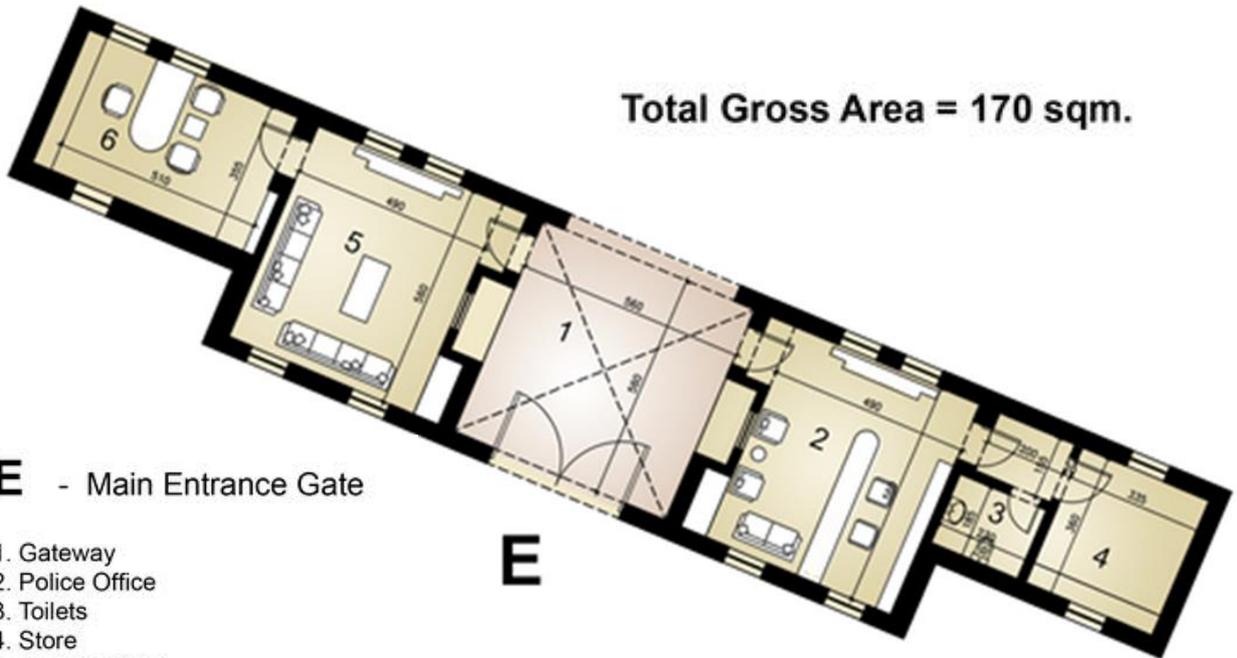
Information :



- 1. Display
 - 2. Information
 - 3. Store
 - 4. Reception Area
- Total Gross Area : 88 m²

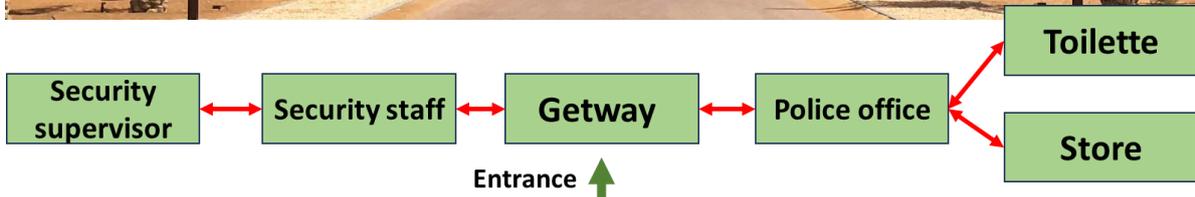


Main Entrance Gate :

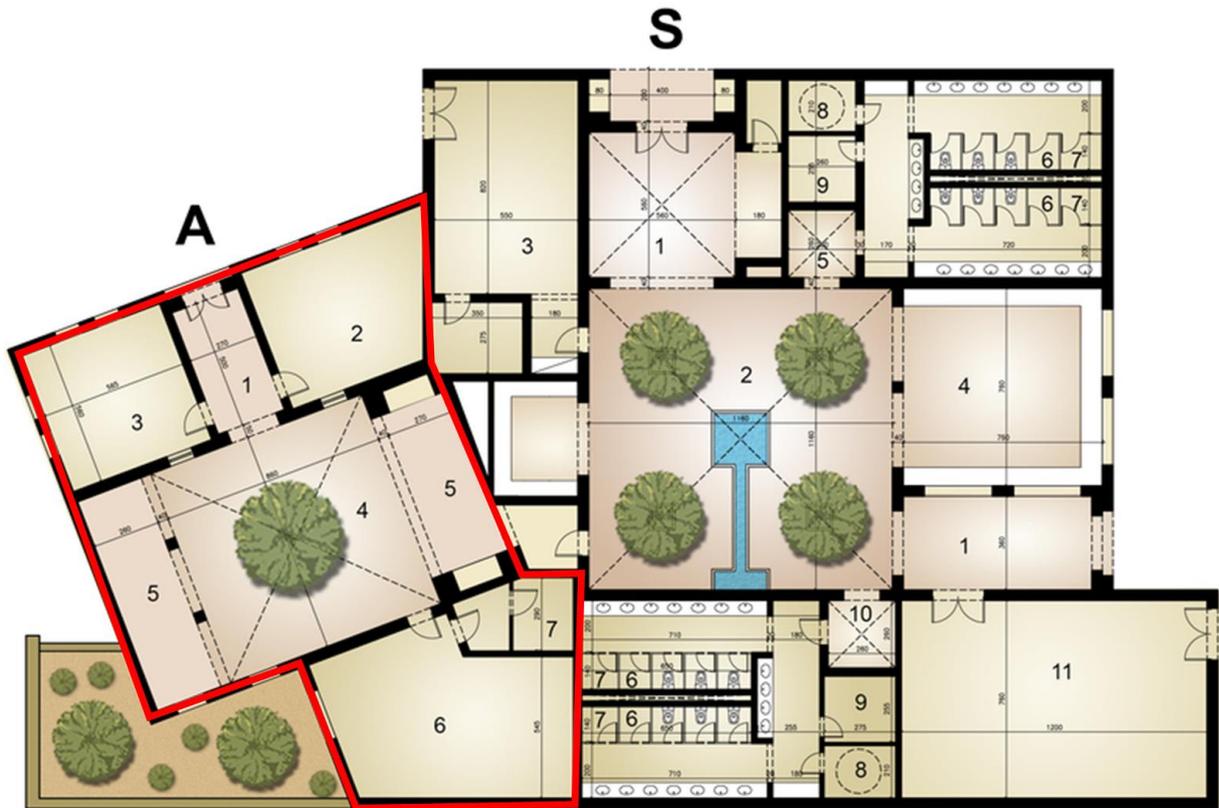


E - Main Entrance Gate

- 1. Gateway
- 2. Police Office
- 3. Toilets
- 4. Store
- 5. Security Staff
- 6. Security Supervisor

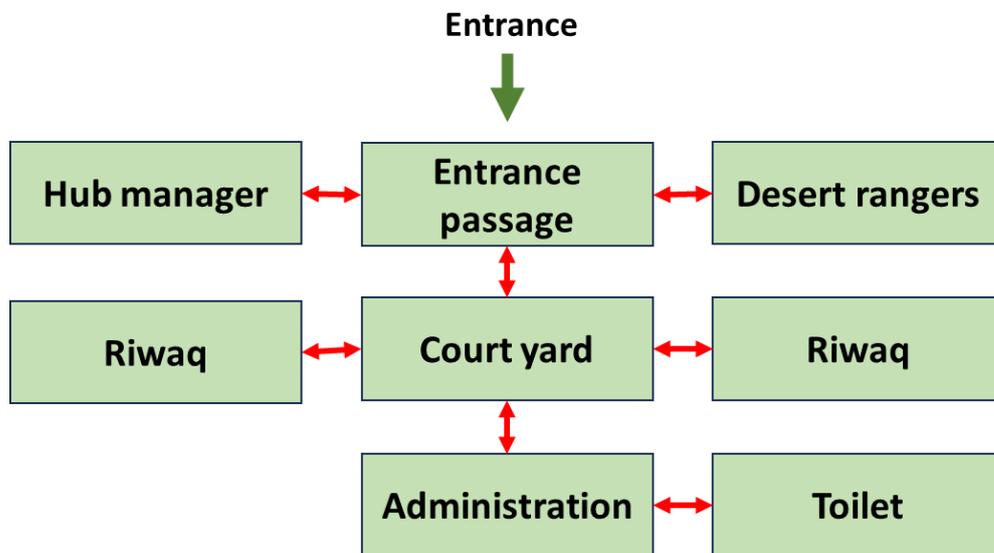


Administration building:

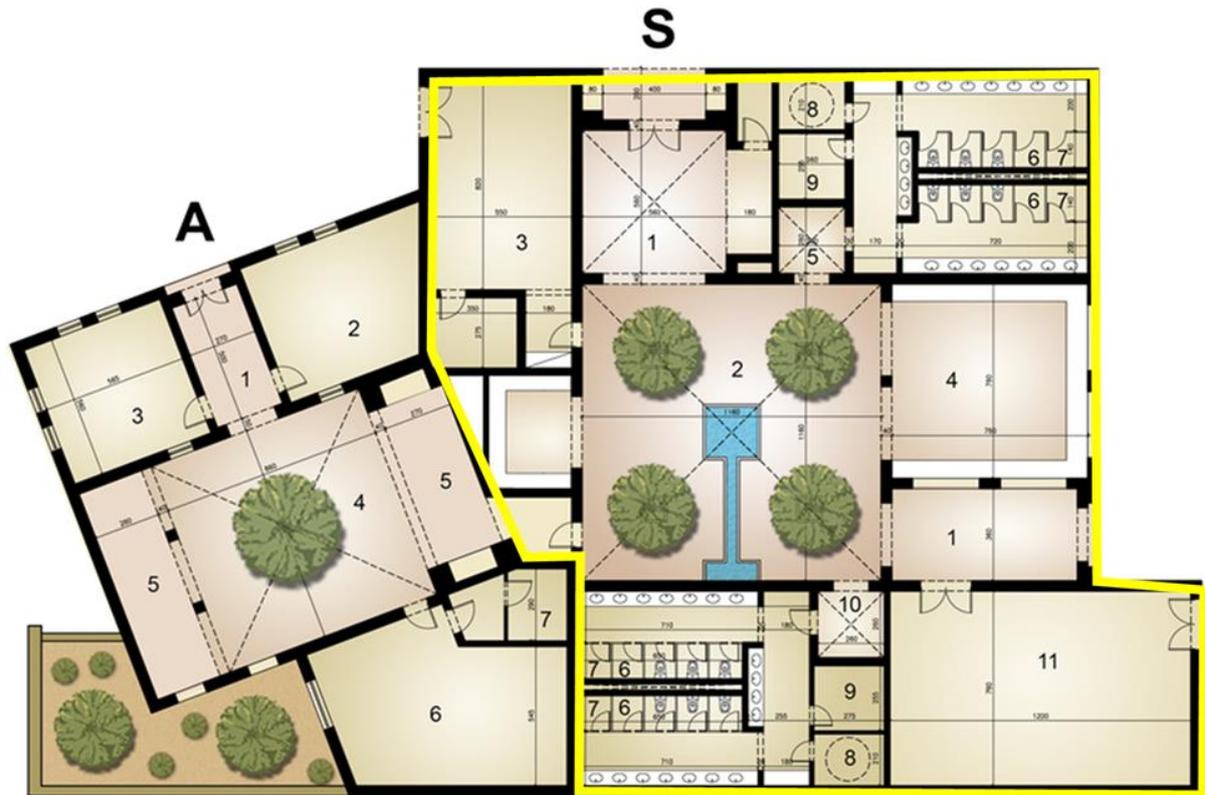


A - Administration Building

- | | |
|---------------------|-------------------|
| 1. Entrance Passage | 5. Riwaq |
| 2. Desert Rangers | 6. Administration |
| 3. Hub Manager | 7. Toilet |
| 4. Courtyard | |



Services building :

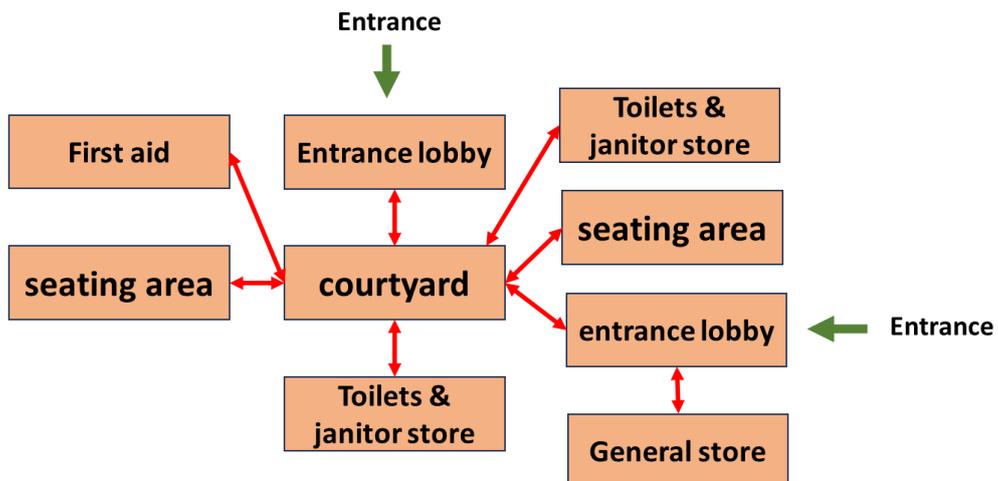


S - Services Building

- 1. Entrance Lobby
- 2. Courtyard
- 3. First Aid
- 4. Outdoor Sitting

- 5. Male Toilets
- 6. Shower
- 7. Changing Room
- 8. Handicapped Toilets
- 9. Janitor Store
- 10. Female Toilets
- 11. General Store

Total Gross Area = 810 sqm.





Al-Manara :

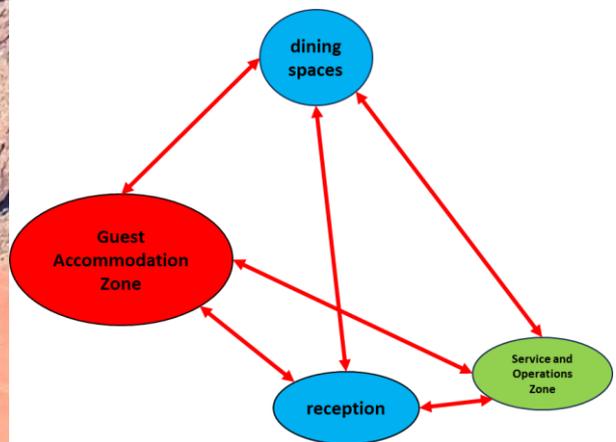
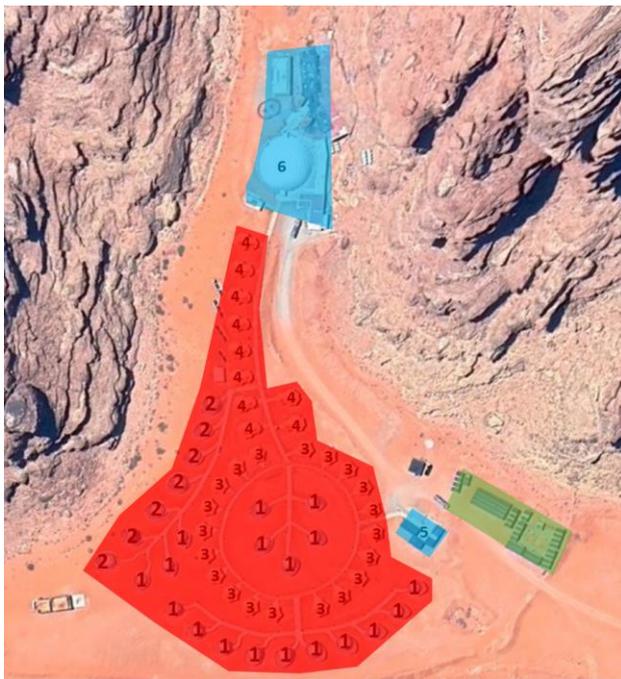
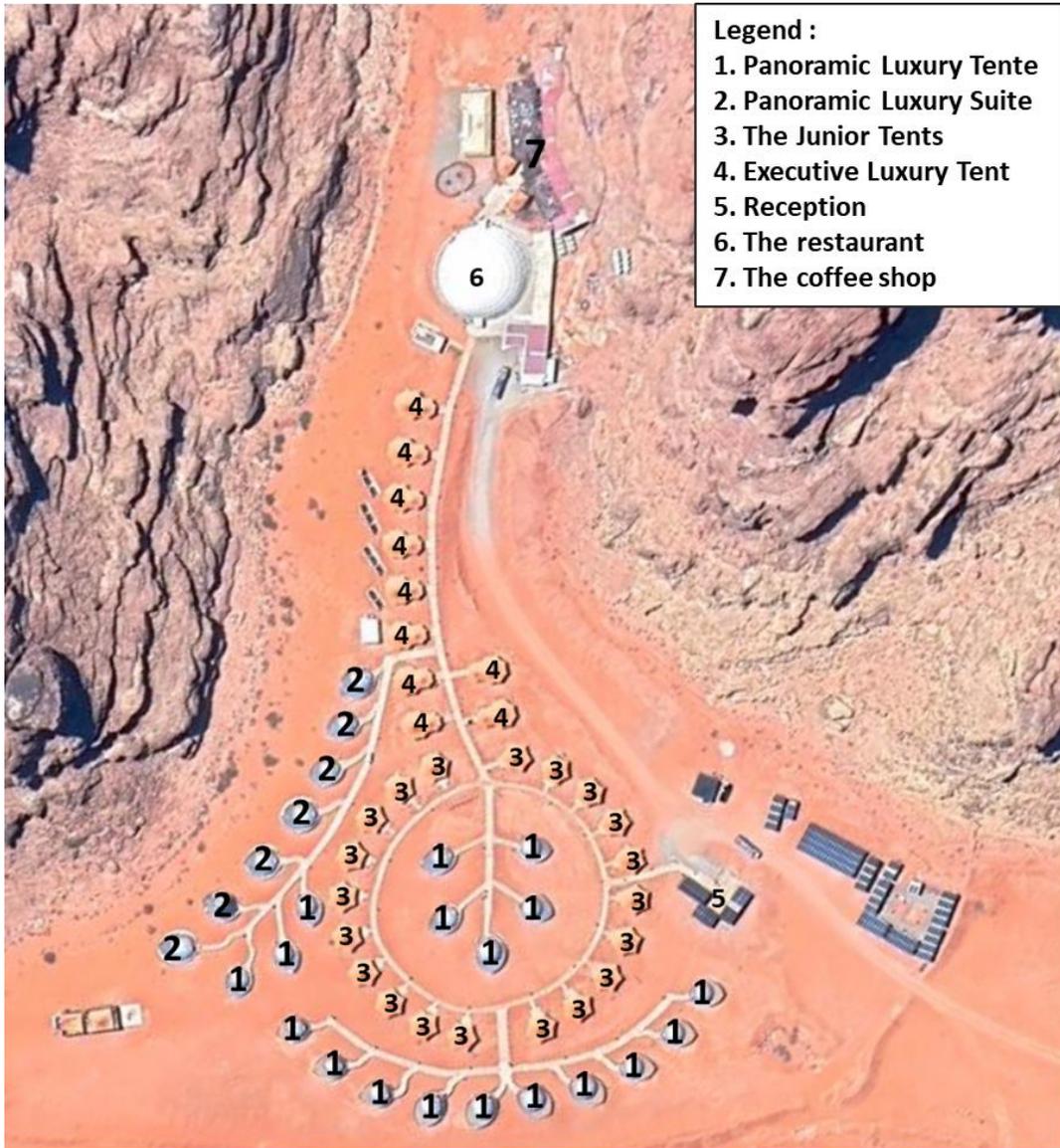
- A unique architectural or symbolic feature, serving as a landmark.



Memories Aicha Luxury Camp, Wadi Rum

Master Planning and Layout :

- The Memories Aicha Luxury Camp consists of 55 tents,
- The tent designs resemble traditional Bedouin tents, paying homage to the local culture and traditions while incorporating modern aesthetics.
- The camp follows a dispersed layout for individual tents to ensure privacy and maximize views of the desert and rock formations.
- Gradual transition to private spaces ensures comfort and exclusivity for guests.



Circulation and Connectivity :



— Pathways

- Access to the camp is primarily by 4x4 vehicles, which are suited for the rugged desert conditions. A designated parking area ensures vehicles do not disturb the main guest areas.



The coffee shop :



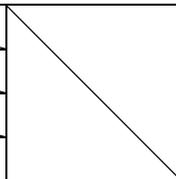
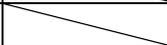
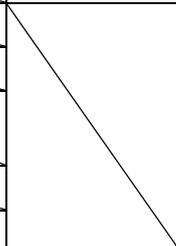
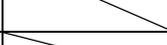
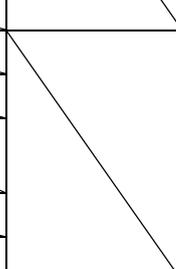
Kona village :

		Space	N	Area	T area
Guest Accommodations	Rooms (Hale)	Bedroom	1	24 m ²	79 m ²
		Bathroom	1	20 m ²	
		Outdoor rain shower	1	2.5 m ²	
		Dressing room	1	11.5 m ²	
		Porch	1	21 m ²	
	Suites (one bedroom Kauhale)	Entrance	1	9 m ²	149 m ²
		Bedroom	1	28 m ²	
		Bathroom	1	22 m ²	
		Living room	1	34 m ²	
		wc	1	3 m ²	
		Outdoor rain shower	1		
		Dressing room	1	14 m ²	
		Porch	1		
	Suites (two bedroom Kauhale)	Entrance	1	10 m ²	245 m ²
		Bedroom 1 (one bed)	1	25 m ²	
		Bathroom 1	1	19 m ²	
		Dressing room 1	1	13 m ²	
		Bedroom 2 (Two bed)	1	36 m ²	
		Bathroom 2	1	15 m ²	
		Living room	1	30 m ²	
		wc	1	4 m ²	
		Porch	1		
	Suites (Foor bedroom Kumakea Kauhale)	Pool space	1		497 m ²
		Kitchen	1	50 m ²	
		Living Room	1	40 m ²	
		Dining space	1	29 m ²	
		Outdoor grill	1		
		Foyer 1	1	7,5 m ²	
		Bedroom one bed 1	1	23.5 m ²	
Bathroom		1	5.8 m ²		
Bedroom Two bed 1		1	23.5 m ²		
Bathroom		1	5.8 m ²		
Foyer 2		1	7 m ²		
Bedroom one bed 2		1	20.3 m ²		
Bathroom		1	8 m ²		
Living room		1			

		Foyer 3	1	7 m ²	289 m ²	
		Bedroom one bed	1	20.3 m ²		
		Bathroom	1	8 m ²		
	Suites bedroom Kauhale)	(foor	Bedroom	4		23.5 m ²
			Bathroom	2		16 m ²
			Bathroom	2		15.5 m ²
			Living room	1		48 m ²
			Kitchen	1		20 m ²
			Laundry room	1		7 m ²
			Patio terrace 1	1		39.5 m ²
			Patio 1	2		11.5 m ²
			Patio terrace 2	1		16 m ²
			Patio 2	2		8 m ²
Firpet and pool area	1	84 m ²				
Communal and Activity	Moana Restaurant	Dining lania	1	279 m ²	2594.8 m ²	
		Lounge	1	144 m ²		
		Display kitchen	1	165 m ²		
		Privat dining	2	71/ 58m ²		
		Restroom	2	127/118 m ²		
		Moana kitchen	1	78.5 m ²		
		Walk in cooler	1	20 m ²		
		In-room dining	1	30.5 m ²		
		Water filtration	1	30.2 m ²		
		Storage	5	46/4/5/ 10/35 m ²		
	Water closet	2	6 m ²			
	Office	5	10/24/ 18/ 13.5/18 m ²			
	Admin assistant	1	18 m ²			
	Guest service	1	220.6 m ²			
	Telephone station	1	14 m ²			
	Work station	1	30 m ²			
	Conference room	1	39 m ²			
	Janitors closet	1	14 m ²			
	Trash	1	10 m ²			
Communal and Activity						

	IDF room	1	11 m ²	
	Boiter	1	31 m ²	
	Electrical	1	25.5 m ²	
	Service yard	1	372 m ²	
	Cart parking	1	152 m ²	
	Outdoor dining	1	320 m ²	
Asaya Spa				
fitness centre				
Shipwreck Adult Pool				
Shipwreck Pool Service				
Welcome hall				
Kahuwai cook house				
Kahuwai market				
Market				
Tennis & pickleball				
Guest parking				

Al-Bedayer Desert Camp :

	Space	N	Area	T area	
C Guest Accommodations	One-Bedroom Private Tent				
	TWO-Bedroom Privaye Tente				
	Deluxe One-Bedroom Private Tent	Bedroom	1		
		an indoor living room	1		
		outdoor sitting area	1		
		swimming pool	1		
	Deluxe Two-Bedroom Private Tent	Bedroom	2		
		an indoor living room	1		
		A private outdoor dining and barbeque space	1		
		outdoor sitting area	1		
		swimming pool	1		
	Deluxe Three-Bedroom Private Tent	Bedroom	3		
		an indoor living room	1		
		A private outdoor dining and barbeque space	1		
		outdoor sitting area	1		
		swimming pool	1		
	Deluxe Room				
	Grand Deluxe Room				
		Courtyard	1	122 m ²	

	The restaurant	Indoor sitting	2	205/134 m ²	465 m ²		
		Kitchen	2	60/44 m ²			
		Store	2	40/10 m ²			
		Male toilets	1	6 m ²			
		Femal toilets	1	6 m ²			
		Outdoor terrace	1	72 m ²			
	Mosque	Entrance	1		465 m ²		
		Riwaq	1	127 m ²			
		Sahn	1	75 m ²			
		Prayer hall	1	162 m ²			
		Courtyard	1	173 m ²			
		Lobby	1	10 m ²			
		Ablutions	1	16.5 m ²			
		Toilets	1	17 m ²			
		Mosque keeper	1	18.5 m ²			
		General store	1	16 m ²			
	Information	Display	1	18 m ²	188 m ²		
		Information	1	23 m ²			
		Store	1	22 m ²			
		Reception Area	1	125 m ²			
Main Entarnance Gate	Get way	1	40 m ²	170 m ²			
	Police office	1	38 m ²				
	Toilets	1	16 m ²				
	Store	1	12 m ²				
	Security staff	1	38 m ²				
	Security supervisor	1	26 m ²				
Administration area	Administration building	Entrance passage	1	15 m ²	810 m ²		
		Dessert rangers	1	35 m ²			
		Hub manager	1	29 m ²			
		Courtyard	1	61 m ²			
		Riwaq	2	22 m ²			
		Administration	1	50 m ²			
		Toilet	1	11 m ²			
	Serveces Building	Entrance lobby	1	27/21 m ²			
		Courtyard	1	116 m ²			
		First aid	1	51.5 m ²			
		Outdoor setting	1	49 m ²			
		Male Toilets	1	52 m ²			
		Shower	4	2 m ²			
		Changing room	4	2 m ²			
		Handicapped toilets	2	5 m ²			
		Janitor store	2	5 m ²			
		Female toilets	1	52 m ²			
		General store	1	73 m ²			
		Amphitheater					
		TV studio					
Cafe							
Substation							

Memories Aicha Luxury Camp, Wadi Rum :

		Space	N	Area	T area
Guest Accommodations	Panoramic Luxury Suite				
	Panoramic Luxury Tent				32 m ²
	Executive Luxury Tent	Bedroom	1		50 m ²
		A living room	1		
		Bathroom and shower	1		
	The Junior Tents	Bedroom	1		35 m ²
Bathroom and shower		1			
	The restaurant				
	The coffee shop				

The Golden Gazelle :

		Space	N	Area	T area
Guest Accommodations	Villas	King bedroom	1		160 m ²
		Twin bedroom	1		
		Bathroom with shower	2		
		Kitchenette	1		
		Private terrace	1	29 m ²	
		Living room	1		
	King Deluxe Bed Bed	King delux bedroom	1		
		Bathroom	1		
		Private terrace	1	29 m ²	
	Communicating Villas	King bedroom	1		
		Bathroom	1		
		Twin bedroom	1		
		private terrace	1	29 m ²	
	Noumade tent	Bedroom	1		32 m ²
private bathroom with shower		1			
	TOUAREG tent				
The Cupola hotel	Standard Suite		87		
	Standard Rooms	Communicating Rooms			
	Standard Twin Room				
Communal and Activity Areas	The Cupola Restaurant				
	Toumour Room				
	large khaima room				
	Pool				
	THE GRILL restaurants				
	The Mirage restaurant				
	The South Restaurant & SKYBAR				
	SPA The Hundred Skies				
	Fitness Center				
Isabelle Eberhardt Museum					

Annex 02

A2							X	X				
A3	X	X				X					X	X

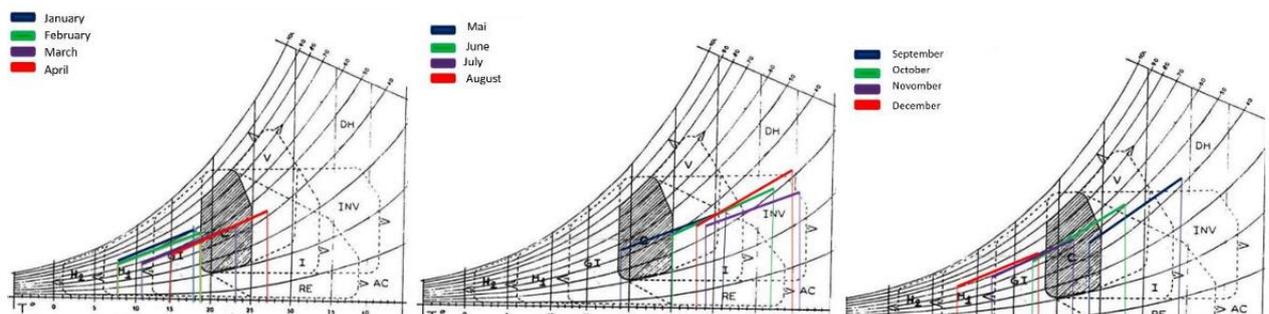
Givoni's diagram :

a- Humidity :

	J	F	M	A	M	J	J	A	S	O	N	D
Humidity Rel. Max	61	56	51	47	44	40	35	38	47	55	57	60
Humidity Rel. Min	60	51	46	42	36	31	26	31	42	50	55	59

b- Temperature :

	J	F	M	A	M	J	J	A	S	O	N	D
Avrg Temp Max	18	19	23	27	31	37	41	40	34	28	22	18
Avrg Temp Min	8	8	11	15	19	25	29	28	24	17	12	8



Recommendations drawn from Givoni diagrams:

Month	Recommendations	Month	Recommendations	Month	Recommendations
January	H1, GI	May	V, I, INV, AC	September	V, I, INV, AC, DH
February	H1, GI	June	V, I, INV, AC	October	GI, C, V, I
March	H1, GI, C	July	V, I, INV, AC	November	H1, GI
April	GI, C, V	August	V, I, INV, AC, DH	December	H1, GI

- H2: Active solar heating
- H1: Passive solar heating
- C: Comfort
- V: Ventilation
- I: Strong inertia
- H: Heating
- GI: Internal gain
- AC: Cooling
- DH: Dehumidification
- INV: Very high inertia and night ventilation
- RE: Ventilation cooling

Architectural recommendations for Algeria (N.Ould Hnia):

summer climate zones :

According to the summer climatic zones which were defined by Ould Hnia, the wilaya of Biskra is located in zone E3 (pre-Sahara tassili), this zone is characterized by a very hot and dry summer.

Recommendations	Principles for the Summer Period
1. Orientation	North-south (east and west are to be avoided).
2. Spacing between buildings	Compact layout by reducing the exposure of walls to the exterior
3. Summer ventilation or aeration	Night ventilation
4. Openings/windows	Average 25 to 40%
5. Walls and floors	Solid walls and floors. High multi-day thermal inertia (excluding overheating periods) with light colors.
6. Roof	Solid. High multi-day thermal inertia (excluding overheating periods) with light colors.
7. Thermal insulation	Insulated roof
8. Protection	Summer protection. Complete shading of openings, north-south openings
9. Outdoor spaces	Outdoor sleeping areas. Outdoor kitchen
10. Vegetation	Vegetation shades walls and windows.
11. Passive Heating	/

b-winter climate zones :

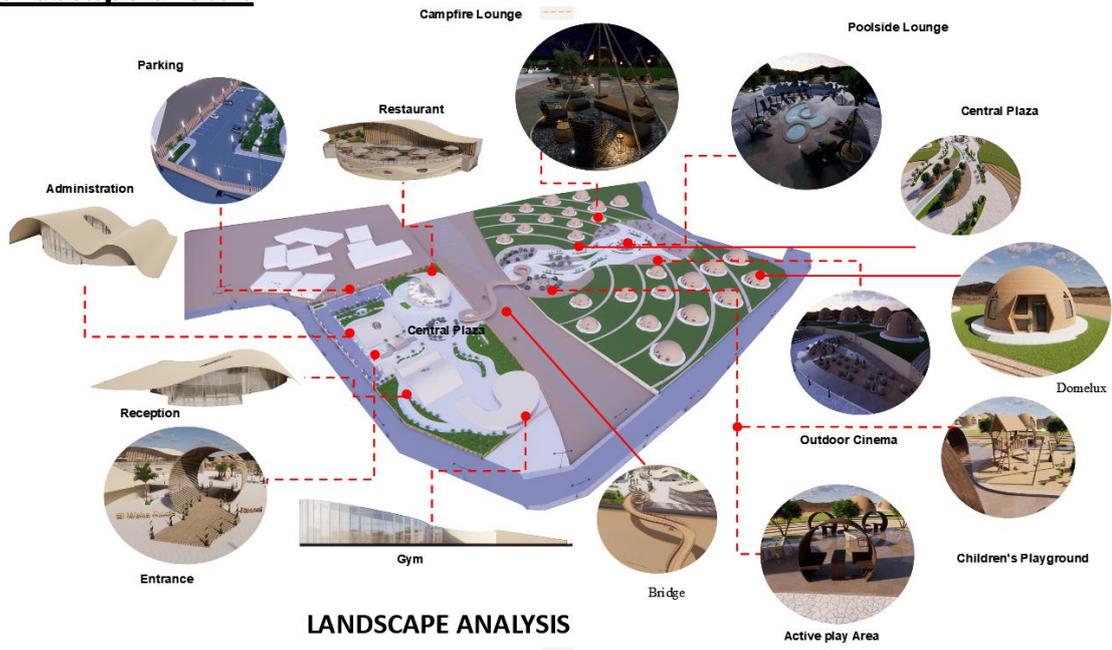
According to the winter climatic zones, which were defined by Ould Hnia, the wilaya of Biskra is located in zone H3a, this zone is characterized by an altitude between 500-1000.

Recommendations	Principles for the Summer Period
1. Orientation	Desired north-south with vertical occupation of spaces.
2. Spacing between buildings	Compact layout by reducing the exposure of walls in contact with the exterior
3. Summer ventilation or aeration	/
4. Openings/windows	For the total area of planned openings, allocate a south-facing glazing area equal to 0.15 per m ² of floor space for winter sun capture.
5. Walls and floors	Solid walls and floors - daily thermal inertia > 8 hours, compromise to be made with summer.
6. Roof	Solid and insulated roof.
7. Thermal insulation	Thermal insulation of the roof.
8. Winter protection	from sandstorms by planting evergreens that grow in the south.
9. Outdoor spaces	/
10. Vegetation	Evergreen vegetation to protect against cold and especially sandstorm prevailing winds.
11. Passive Heating	Passive heating through storage, solid walls, inertia phase shift 8 to 12 hours or south-facing glazing.
12. Climatisation	/

Annex 03

Renders:

1. Landscape shots :











1.1. Active play area :



1.2. Children's play ground :



1.3. seating area :



1.4. Outdoor cinema :



1.5. Poolside lounge :



1.6. Telescope deck :



1.7. Campfire lounge :



2. Bangalow shots :



2.1. Type 01 :



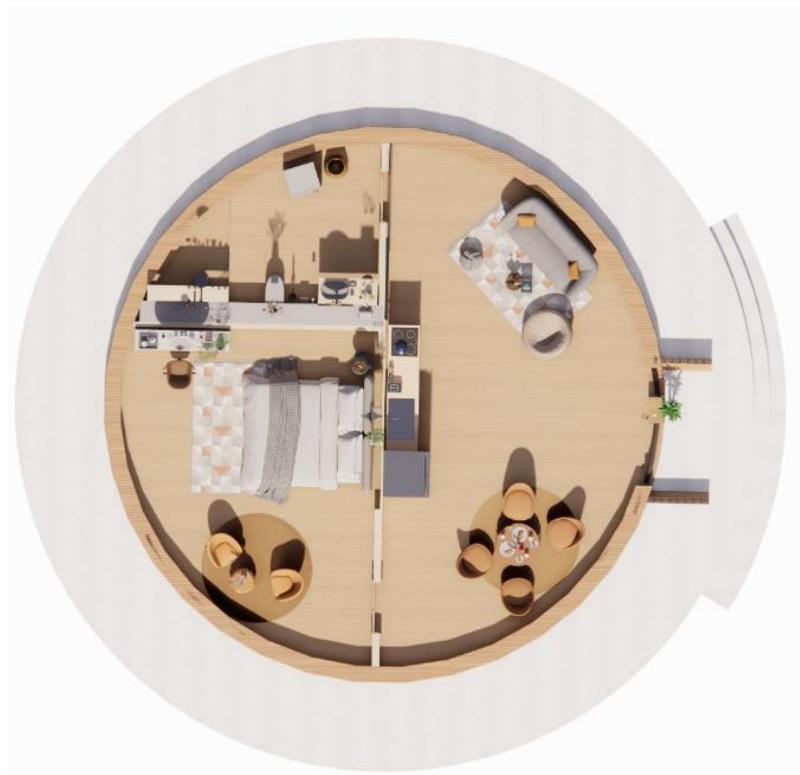
Indoor shots :



Outdoor shots :



2.2. Type 02 :





Indoor shots :



Outdoor shots :



Annex 04



رقم $\frac{1}{H}$ الحاضنة / 2025

شهادة توظيف / تحضين "مشروع مبتكر ضمن قرار 1275"

انا الممضي أسفله، السيد (ة): محمد جلاب

مسير(ة) حاضنة الأعمال: جامعة محمد خيضر - بسكرة.

المقر الاجتماعي / العنوان: المجمع الإداري المقابل لكلية العلوم الاقتصادية، الطابق الثاني، جامعة بسكرة 07000

رقم علامة الحاضنة: 2311223051

تاريخ تسليم العلامة: 23 نوفمبر 2022

أشهد أن الطالب / الطلبة التالية أسمائهم:

الاسم واللقب	الطور الدراسي	التخصص	الكلية
بلعصادي روميصة	ماستر 2	هندسة معمارية	الهندسة المعمارية و ال عمران والهندسة المدنية والري

تحت إشراف الاساتذ/الاساتذة التالية أسمائهم:

الاسم واللقب	الرتبة	التخصص	الكلية
مزردى توفيق	أستاذ محاضر - أ-	هندسة معمارية	الهندسة المعمارية و ال عمران والهندسة المدنية والري
سعدي محمد ياسين	أستاذ محاضر - أ-	هندسة معمارية	الهندسة المعمارية و ال عمران والهندسة المدنية والري

تم احتضانه على مستوى حاضنة أعمال جامعة محمد خيضر - بسكرة بمشروع تحت اسم:

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

خلال السنة الجامعية 2024 / 2025.

سلمت هذه الشهادة بطلب من المعني للإدلاء بها في حدود ما يسمح به القانون .

حرر في بسكرة بتاريخ: 2024/10/10



مدير الحاضنة
الناشطة
Start Up
Incubator
مسؤول حاضنة المؤسسات الناشئة
د/ منتهم حسناء جيسون



الجمهورية الجزائرية الديمقراطية الشعبية

وزارة التعليم العالي والبحث العلمي جامعة محمد خيضر - بسكرة -

جامعة محمد خيضر - بسكرة



عنوان المشروع:

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

صورة العلامة التجارية



الاسم التجاري

Dynadome

بطاقة معلومات:

حول فريق الاشراف وفريق العمل

1-فريق الاشراف

فريق الاشراف	
الهندسة المعمارية و العمران و الهندسة المدنية و الري	الاستاد المشرف مزردى توفيق
الهندسة المعمارية و العمران و الهندسة المدنية و الري	الاستاد المشرف سعدي محمد ياسين

2-فريق العمل

الكلية	التخصص	الطالبة
كلية الهندسة المعمارية و العمران و الهندسة المدنية و الري	هندسة معمارية	بلعصادي روميسة

فهرس المحتويات

المحور الأول: تقديم المشروع

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المحور الثالث: التحليل الاستراتيجي للسوق

المحور الرابع: خطة الإنتاج والتنظيم

المحور الخامس الخطة المالية

المحور السادس النموذج الاولي التجريب

المحور الأول: تقديم المشروع

بدأت فكرة هذا المشروع عند ملاحظتنا لتحدٍ متزايد في المجال المعماري المعاصر، يتمثل في محدودية تفاعل المباني الثابتة مع المتغيرات البيئية الديناميكية، خاصةً حركة الشمس وتغيرات الإضاءة الطبيعية. في الوقت الذي يتزايد فيه الاهتمام بالاستدامة والطاقة النظيفة، لا تزال معظم المباني مصممة لتبقى في وضعية جامدة غير قادرة على التكيف تلقائياً مع محيطها الطبيعي.

تشير دراسات الطاقة في الأبنية إلى أن حوالي 30 إلى 40% من استهلاك الطاقة في المباني يذهب للتدفئة، التبريد، والإضاءة الاصطناعية (U.S. Energy Information Administration, 2022). هذا الاعتماد الكبير على الحلول التقنية الصلبة يمكن تخفيفه بشكل جذري من خلال تصميمات ديناميكية تستفيد من التوجيه الشمسي الطبيعي.

كما أن دراسات العمارة البيوكلي M a Tية أثبتت أن توجيه المبنى بزاوية صحيحة نحو الشمس يمكن أن يقلل استهلاك الطاقة بنسبة تصل إلى 25% (Olgyay, V., Design with Climate, 2015). ولكن في الواقع، الموقع الثابت للمباني لا يسمح لها إلا بتحقيق توجيه واحد ثابت، مما يُفقدنا هذه الإمكانية على مدار اليوم والفصول. من هنا ظهرت فكرة "نظام الدوران الذكي"، وهو نظام ميكانيكي إلكتروني يسمح بتحريك المبنى أو جزء منه بشكل بطيء وآمن، ليتماشى مع موقع الشمس أو يُقدّم للمستخدم أفضل إطلالة ممكنة في أي وقت. وقد تأكدت جدوى الفكرة من خلال تجارب سابقة محدودة مثل منزل Johnstone في أستراليا، الذي يزن 272 طناً ويدور حول نفسه ببطء باستخدام محرك كهربائي لا تتجاوز قوته 1.5 حصان. هذه التجربة الفردية أثبتت إمكانية تحقيق الحركة بدقة وأمان وراحة تامة للمستخدم.

لكن ما كان ينقص السوق هو نظام معياري جاهز للدمج في المشاريع المعمارية المختلفة، وهو ما نسعى لتوفيره من خلال هذا المشروع.

1- فكرة المشروع الحل المقترح

مشروعنا يتمثل في تطوير وتقديم "نظام دوران ذكي" مخصص للهياكل المعمارية، يُتيح للمباني أو لأجزاء منها الدوران ببطء وبدقة عالية، بما يتماشى مع حركة الشمس أو مع تفضيلات المستخدم، بهدف تحقيق أقصى درجات الراحة البصرية، والكفاءة الطاقوية، والتكامل الجمالي مع المحيط.

هذا النظام ليس مجرد آلية ميكانيكية، بل هو منتج معماري-تقني متكامل، يجمع بين:

- هيكل دوران متين مزود بمحامل عالية القدرة، قادر على تحمل أوزان قد تتجاوز 80 طن.
- محرك كهربائي منخفض الاستهلاك يضمن حركة بطيئة جداً (1 درجة كل 4 دقائق)، دون أي اهتزاز.

محسوس.

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

- نظام تحكم ذكي يتيح التشغيل اليدوي أو التلقائي، عبر لوحة رئيسية داخلية أو من خلال تطبيق على الهاتف الذكي.
 - برمجيات مدمجة وخوارزميات تتبع شمسي تقوم بضبط دوران المبنى بشكل تلقائي لتحقيق أفضل توجيهه للإضاءة الطبيعية على مدار اليوم.
 - نقطة مركزية ثابتة (Swivel Core) تضمن استقرار وتمرير الكهرباء، المياه، والبيانات أثناء الدوران دون انقطاع.
- هذا النظام تم اختباره بنجاح على نموذج تجريبي "بنغل دائري خشبي" صورة(1)، وأثبت قدرته على التحمل والدقة والراحة التشغيلية، مما يجعله قابلاً للتطبيق في عدة مجالات معمارية مثل:
- الكبسولات السياحية البيئية
 - الكرفانات الفاخرة
 - الغرف الفندقية ذات الإطلالة المتغيرة
 - المنازل الذكية القابلة للتكيف
 - المنصات المعمارية التجريبية أو الثقافية
- التميز الحقيقي لهذا المشروع يكمن في قدرته على تقديم نظام جاهز للتكامل (Plug & Play)، يُمكن دمجه من طرف المماريين والمطورين مباشرةً في مشاريعهم دون الحاجة إلى تصميم النظام من الصفر، مما يوفر الوقت، ويعزز القيمة الابتكارية والتسويقية للبناء.



صورة 1 النموذج التجريبي للنظام في بنغل خشبي

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

العنصر	الشرح
طبيعة المشروع	مشروع صناعي-تقني ذو طابع ابتكاري، يهدف إلى تصميم وتصنيع نظام دوران معماري ذكي يمكن دمجه في المباني والهياكل المختلفة، بهدف تحسين التفاعل مع العوامل البيئية، خصوصاً الإضاءة الطبيعية
اسم المشروع	Dynadome
مجال النشاط	صناعي
موقع المشروع	ولاية بسكرة
النطاق	وطني، دولي
الفئة المستهدفة	مكاتب الدراسات الهندسية والمعمارية- مستثمرو السياحة الإيكولوجية والفندقة الفاخرة- شركات البناء المتخصص في الهياكل المعيارية- مصممو المنتجات الذكية "Smart Living"- هيئات البحث والتطوير في مجال الاستدامة المعمارية
عدد العمال	12
تسمية النشاط	تصنيع وبيع أنظمة الدوران الذكي للمباني وتوفير خدمات ما بعد البيع (تركيب، صيانة، تخصيص، برمجة)
مضمون النشاط	تطوير وتصنيع آلية دوران متكاملة للمباني تشمل قاعدة ميكانيكية، محرك منخفض السرعة، نظام تحكم ذكي، ومنصة تكامل مع الهيكل المعماري. تُباع هذه المنظومة كمنتج نهائي قابل للدمج في مشاريع البناء الجديدة أو المعدلة.
الشكل القانوني للمؤسسة	شركة ذات مسؤولية محدودة (S.A.R.L) - بنشاط إنتاج وخدمات تقنية متقدمة
تكلفه شراء الارضية	00 دينار جزائري

3-القيم المقترحة

- تفاعل ديناميكي مع البيئة الطبيعية، يقدم النظام إمكانية توجيه المبنى تلقائياً مع حركة الشمس، ما يحسّن الإضاءة الطبيعية، ويقلل الحاجة للطاقة الاصطناعية (إضاءة، تبريد، تدفئة)، هذه القيمة تلبى متطلبات العمارة bioclimate والمباني الذكية الخضراء.
- نظام تحكم ذكي وسهل الاستخدام، يحتوي النظام على واجهة استخدام متطورة، يمكن التحكم بها يدوياً أو أوتوماتيكياً، محلياً أو عن بعد عبر الهاتف الذكي، مع خصائص مثل حفظ الزوايا المفضلة، تتبع الموقع الشمسي، وتحديد السرعة بدقة.

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

- حلّ معماري جاهز للدمج (Plug & Play)، يُسوق النظام كوحدة مستقلة قابلة للدمج المباشر في أي مشروع معماري، دون الحاجة لإعادة تصميم هندسي شامل هذه المرونة تُسهّل تبني النظام من قبل مكاتب الدراسات والمطورين العقاريين.
- راحة المستخدم وتنوع التجربة البصرية، يمكّن المستخدم من تغيير إطلالة المسكن حسب الرغبة أو الموسم، ما يخلق تجربة سكنية متجددة ومرتبطة بالمحيط الطبيعي.
- كفاءة في استغلال الطاقة وتقليل البصمة الكربونية، بفضل التوجيه الذكي، يتحسن أداء المبنى الحراري والضوئي، مما ينعكس على تقليل استهلاك الطاقة بنسبة قد تصل إلى 20-25% في بعض الحالات.
- سهولة في الصيانة والدعم التقني، تم تصميم النظام بحيث يسمح بالمتابعة والصيانة عن بعد، مع توفر تحديثات برمجية، وفريق دعم فني مستمر، مما يزيد من ثقة العملاء واستدامة المنتج.
- تصميم موثوق وآمن وقابل للتخصيص، يعتمد النظام على بنية ميكانيكية قوية ومحركات بطيئة ذات عزم كبير، تضمن حركة سلسلة وأمنة. كما يمكن تخصيص الحجم والمواد والتكامل حسب متطلبات المشروع.
- ميزة تسويقية للمشاريع السياحية أو الفندقية، وجود مبنى "يتحرك" ببطء في موقع طبيعي يشكل عامل جذب بصري وتسويقي قوي، ويمنح قيمة مضافة للمشاريع البيئية أو الفاخرة.
- الابتكار كمصدر للتميز والتفرد في السوق، كون النظام لا يزال غير منتشر في السوق المحلية، فإنه يمنح تبنيه ميزة تنافسية قوية للمعماريين والمطورين الذين يبحثون عن حلول تكنولوجية متميزة.

4-فريق العمل

الطلبة	التخصص	الدورات التكوينية
بلعصادي روميسة	هندسة معمارية	- شهادة في اللغة الانجليزية مستوى B2
		- تربص ميداني على مستوى مديرية الترقية والتسيير العقاري-بسكرة.

5-اهداف المشروع

- الأهداف قصيرة المدى (في غضون 12 إلى 24 شهراً)
- استكمال تطوير النموذج الصناعي النهائي للنظام (Version industrielle)، الانتهاء من تصميم، تصنيع وتجريب نسخة صناعية قابلة للتكرار تجارياً، بعد النسخة التجريبية على البنغل.
- الحصول على شهادة اعتماد تقني ومعماري للنظام بالتعاون مع مركز بحث أو هيئة معمارية من أجل ضمان المطابقة لمعايير الأمان والجودة.

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

- إطلاق حملة تسويقية رقمية وميدانية موجهة لمكاتب الدراسات وشركات البناء تشمل موقع إلكتروني احترافي، فيديوهات توضيحية، ونماذج ثلاثية الأبعاد تفاعلية.
- تركيب النظام في 2 إلى 3 مشاريع فعلية كنماذج أولية تطبيقية (Projets pilotes) في مشاريع بيئية، وحدات سياحية، أو فضاءات عرض، لتوثيق الأداء وتكوين مرجع عملي.
- بناء شراكات استراتيجية مع مكاتب دراسات ومصانع معدّات متخصصة من أجل ضمان سلسلة إنتاج مرنة، ومرافقة هندسية فعالة عند إدماج النظام في تصاميم جديدة.
- تكوين فريق عمل تقني وتجاري مستقر يشمل مهندسين، فنيين، مسوقين، ومبرمجين، مع خطة تكوين مستمر داخلي.

• الأهداف بعيدة المدى (3 إلى 5 سنوات)

- توسيع نطاق السوق ليشمل دول شمال إفريقيا أو الشرق الأوسط من خلال شراكات توزيع، أو المشاركة في معارض معمارية دولية (BIG5، BATIMATEC).
- تطوير نماذج متعددة من النظام حسب نوع المشاريع نسخة خفيفة للكرفانات والمنازل الصغيرة، نسخة صناعية للمباني السياحية أو السكنية الكبرى
- تحقيق الإنتاج المحلي الكامل بنسبة لا تقل عن 80% عبر التعاقد مع ورشات تصنيع ميكانيكي وبرمجي محلية، لتقليل التبعية للاستيراد.
- دمج الذكاء الاصطناعي في نظام التتبع الذكي للحركة الشمسية لتعلم سلوك المستخدم وتحسين دوران المبنى بما يلائم العادات اليومية والراحة الحرارية.
- بناء وحدة تصنيع وتجميع دائمة (مصنع مصغر) في منطقة صناعية مجهزة، لتسريع الإنتاج وخفض التكلفة على المدى البعيد.

المحور الثاني: الجوانب الابتكارية

1- طبيعة الابتكار: ابتكارات تقنية وتكنولوجية

2- المجالات الابتكارية:

- تصميم آلية دوران ميكانيكية دقيقة وأمنة للأبنية الثقيلة (أكثر من 80 طن).
- استخدام محركات منخفضة الطاقة مع نظام تخفيض سرعة بنسبة 1:1000.
- دمج خوارزميات تتبع شمسي وحساسات ذكية للتحكم التلقائي.
- إمكانية الدوران اليدوي أو التلقائي حسب رغبة المستخدم أو حركة الشمس.
- حفظ الزوايا المفضلة وتوجيه المبنى تلقائياً إليها.
- قابلية الدمج في مشاريع معمارية متنوعة (سكنية، سياحية، ثقافية...).

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

- واجهة ثلاثية الأبعاد تفاعلية عبر لوحة تحكم ذكية.
- تحكم مباشر أو عن بعد عبر تطبيق هاتف باستخدام رمز QR.
- تجربة استخدام بسيطة ومريحة لجميع الفئات.
- تحسين التوجيه الشمسي لتقليل استهلاك الطاقة للإضاءة والتبريد.
- خفض البصمة البيئية للمبنى عبر استغلال الإضاءة الطبيعية.
- تكامل ميكانيكي ذكي دون التأثير على جمالية أو استقرار الهيكل.
- الحفاظ على مرونة التصميم المعماري مع إضافة قيمة حركية.
- تقديم المنتج كعنصر جذب فريد في المشاريع الفندقية والبيئية.
- إمكانية تسويق النظام كنقطة بيع تنافسية بفضل طابعه التفاعلي والمستدام.

المحور الثالث: التحليل الاستراتيجي للسوق

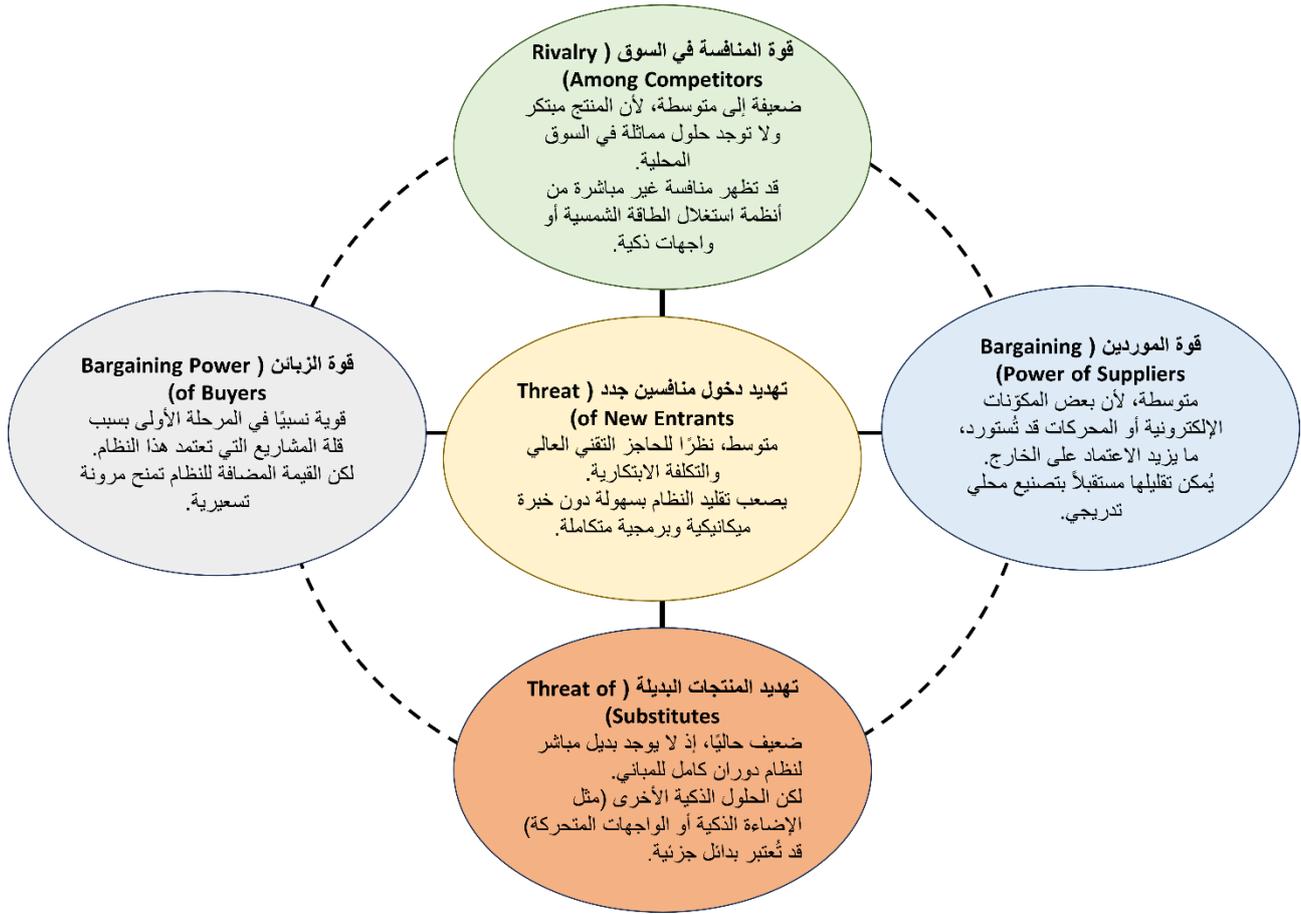
1-تحليل S.W.O.T

نقاط القوة	نقاط الضعف
<ul style="list-style-type: none">- منتج مبتكر وغير مسبوق في السوق الوطنية- إمكانية التخصيص حسب كل مشروع- تجربة مستخدم غنية وذكية- تأثير إيجابي على كفاءة الطاقة	<ul style="list-style-type: none">- تكلفة أولية مرتفعة نسبياً- حاجة إلى توعية السوق بفكرة المبنى المتحرك- اعتماد جزئي على مكونات مستوردة- صعوبة تكوين فريق متعدد التخصصات في البداية

الفرص	التحديات
<ul style="list-style-type: none">- اهتمام متزايد بالبناء المستدام والسياحة البيئية- إمكانية تصدير النظام لأسواق ناشئة- دعم الابتكار في الجزائر من طرف صناديق وتمويلات حكومية وخاصة- اعتماد المعارض الفندقية على التميز البصري والابتكار لجذب العملاء	<ul style="list-style-type: none">- بطء القبول المجتمعي لفكرة "المبنى المتحرك"- تغيرات مفاجئة في أسعار المكونات الإلكترونية- صعوبة الحصول على التراخيص التقنية في بعض المناطق- منافسة من حلول ذكية أرخص لكن غير متكاملة

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

2- تحليل PORTER



3- تحليل PESTEL

القانوني	البيئي	التكنولوجي	الاجتماعي	الاقتصادي	السياسي
المشروع يحتاج إلى تأطير قانوني خاص بالبنائات المتحركة والبنية التحتية المتصلة بها.	النظام يساهم في تقليل البصمة الكربونية، ما ينسجم مع التوجهات العالمية لحماية البيئة.	توفر أدوات برمجة وتحكم ذكي (IoT)، Arduino، etc.)، يُسهل الابتكار؛ لكن التحديث المستمر ضروري للبقاء في المنافسة	وعي متزايد حول أهمية العمارة البيئية والمستدامة، خاصة لدى فئة الشباب والطبقات الراقية.	تقلب أسعار المواد الأولية والمكونات الإلكترونية قد يؤثر على الربحية؛ لكن النظام يُمثل حلاً طويلاً الأمد لتقليل التكاليف الطاقوية.	دعم الدولة للمشاريع الابتكارية وحاضنات الأعمال؛ لكن الإجراءات البيروقراطية قد تُبطئ الانطلاق.

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

4- المزيج التسويقي

الاحتياجات التي يليها	خصائص ومميزات منتجاتك/خدماتك	المنتج/ الخدمة
<ul style="list-style-type: none"> - الراحة البصرية - تقليل استهلاك الطاقة - التفاعل مع البيئة - تجربة سكنية متغيرة ومخصصة 	<ul style="list-style-type: none"> - حركة بطيئة وآمنة للمبنى (1° كل 4 دقائق) - إمكانية التوجيه اليدوي أو التلقائي - تطبيق هاتفي ذكي للتحكم - حفظ الزوايا المفضلة - آلية صامتة وموفرة للطاقة 	<ul style="list-style-type: none"> نظام دوران ذكي قابل للدمج في المشاريع المعمارية، يتكون من قاعدة دوارة، محرك كهربائي، لوحة تحكم ذكية، وبرمجيات مدمجة.

5- السعر

سيتم الاعتماد على سياسة التسعير بالتكلفة بحيث: سعر المنتج = تكلفة الوحدة للمنتج + هامش الربح

• السعر المقترح حسب نوع العميل

الملاحظات	السعر المقترح للنظام الأساسي	نوع العميل
سعر مدعوم لتكوين رصيد مرجعي	1,400,000 - 1,600,000 دج	مشاريع تجريبية أو جامعية
مع عرض التثبيت والدعم المجاني	1,800,000 - 2,200,000 دج	زبون فردي (فيلات - كبسولات)
يشمل الدعم + التركيب + التدريب	2,500,000 - 3,000,000 دج	مكاتب دراسات / مشاريع متوسطة
سعر ممتاز لخدمة استثنائية	3,200,000 - 4,000,000 دج	فندقة أو شركات سياحية فاخرة

• باقة ذكية مقترحة (Smart Bundle)

- "باقة الدوران الذكي": تتضمن النظام + التركيب + التطبيق الذكي + سنة صيانة، السعر المقترح: 2,700,000 دج

• استراتيجية تسعير ذكية للمستثمر

- بيع الوحدات الأولى ب هامش ربح بسيط أو شبه صفر لبناء الثقة والسوق.

- تعويض الربح من خدمة الاشتراك الذكي السنوي + صيانة.

- في التوسعة، اعتماد تصنيع بالجملة يخفض التكلفة بنسبة 25-30%.

• سعر الإطلاق التجاري = 2.500.000 - 2.700.000 دج، مع إمكانية تخفيضه للمشاريع التجريبية، ورفعها للمشاريع الفاخرة.

6- الترويج

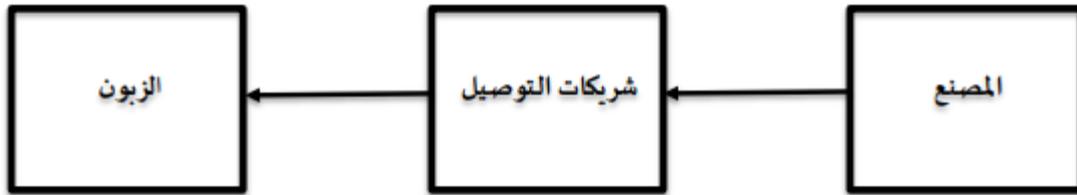
آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

وسيلة الترويج	التفاصيل	التكلفة
مقابلة	من خلال الذهاب للمؤسسات وعرض المنتج	تكلفة النقل = 2000 دج
الدعاية والاعلان على مواقع التواصل الاجتماعي	نشر منشورات على وسائل التواصل الاجتماعي في المجموعات التي تحتوي على الشريحة المستهدفة	2000 دج
لوحات إعلانية	يتم تصميم بطاقات عمل وتوزيعها على الأشخاص المهتمين بالمنتج	تكلفة الطباعة
فتح موقع خاص	فتح موقع خاص بالمؤسسة لتسهيل العملية	مجاني
المجموع		/

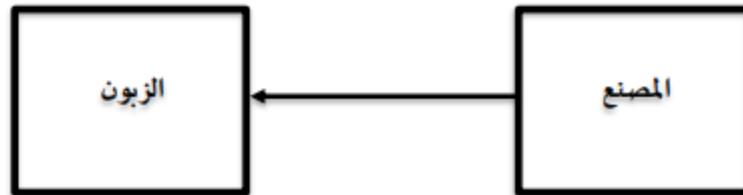
7- التوزيع

ستكون على طريقتين

- الطريقة الأولى:



- الطريقة الثانية:



طريقة الدفع: طريقة الدفع تكون على شكل كاش عند الاستلام او عن طريق CCP

8- عرض القطاع السوقي

- السوق المستهدف (Target Market)

يشمل العملاء الذين نوجّه إليهم عرضنا التجاري بشكل مباشر في المرحلة الأولى، والذين لديهم القدرة

المالية والاهتمام العملي بتبني نظام الدوران الذكي:

- مكاتب الدراسات الهندسية والمعمارية الباحثة عن دمج حلول ذكية في تصاميمها.

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

- شركات الإنشاءات العقارية التي تروج للمباني الخضراء والمبتكرة.
- مستثمرون في السياحة الإيكولوجية والفندقة الفاخرة، الراغبون في تقديم تجارب مميزة وفريدة.
- هيئات حكومية أو جامعية تسعى لإنشاء مباني تجريبية أو ثقافية مستدامة.
- **السوق المحتمل (Potential Market)**
هو القطاع الأوسع الذي يمكن التوسع نحوه في المرحلة المتوسطة والطويلة، ويشمل عملاء قد لا يكونون مستعدين في البداية، لكن لديهم القابلية لاعتماد الحل مستقبلاً:
 - شركات المقاولات الصغيرة والمتوسطة التي قد تدمج النظام لاحقًا كمكمل تجاري أو جمالي.
 - البلديات والمجالس المحلية في المشاريع السياحية أو البيئية.
 - المطورون العقاريون في الأسواق الناشئة (شمال إفريقيا، الخليج، جنوب أوروبا).
 - أصحاب منازل فاخرة خاصة أو مشاريع "Smart Living" في ضواحي المدن.
- **السوق المتخصص (Niche Market)**
سوق ضيق ومميز يتميز بطلب دقيق ومخصص، لكنه مستعد لدفع سعر أعلى مقابل حلول ذات قيمة عالية وخصوصية:
 - مشاريع معمارية تجريبية أو رمزية (جناح وطني، متحف، مركز علمي، فضاءات معارض متنقلة).
 - مراكز أبحاث معمارية وبيئية تُجرب نظم البناء الديناميكية.
 - مصممو كبسولات أو كرفانات فاخرة قابلة للدوران.
 - شركات متخصصة في الحلول الذكية للمباني المستقبلية (Smart Construction Labs).

9- تحليل السوق

• تحليل الزبائن

طريقة الإقناع	الاحتياجات	الفئة
عرض نظام متكامل قابل للتكامل + توثيق تقني	البحث عن حلول مبتكرة لتضمينها في تصاميمهم	مكاتب الدراسات الهندسية والمعمارية
تقديم حلول جاهزة ومرنة توفر الطاقة وتلقت انتباه العملاء	تقنيات ترفع من قيمة المشروع التسويقية	شركات البناء والتطوير العقاري
إقناعهم بأن النظام يقدم قيمة تسويقية مباشرة	جذب العملاء بتجربة سكنية فريدة في مواقع طبيعية	مستثمرون في السياحة البيئية
دعم فني دائم وسهولة في التخصيص	نظام جاهز للدمج في وحدات قابلة للحركة أو التكيف	مصممو وحدات سكنية ذكية

• تحليل المنافسين

1. Everingham Rotating House

- الموقع: Ballina, New South Wales, Australia

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

- المنصة: everinghamrotatinghouse.com.au
- الخبرة: تم تطويره منذ أكثر من 20 سنة، منزل دوار يزن 50 طنًا، يستخدم نظام تحكم كهربائي بسيط.
- النشاط: منزل خاص، لا يتم تسويق النظام كمنتج صناعي.

.2 Domespace

- الموقع: Bretagne, France
- المنصة: domespace.com
- الخبرة: خبرة تفوق 30 سنة في بناء منازل خشبية دائرية قابلة للدوران، تستهدف الأسواق الفاخرة.
- النشاط: بيع منازل كاملة بتصاميم خاصة، وليس فقط النظام الميكانيكي.

.3 Rotating Homes Inc

- الموقع: Ontario, Canada
- الخبرة: تطوير منازل تعتمد على النظام الدوار لأغراض استعراضية وسكنية.

.4 Johnstone's Rotating House

- الموقع: Wingham, New South Wales, Australia
- المنصة: rotatinghome.com.au
- الخبرة: تم بناؤه سنة 2006، يدور بالكامل بزواوية 360°، يزن حوالي 272 طنًا (600,000 lbs)، ويعتمد على محرك كهربائي صغير بقوة 1.5 حصان فقط
- النشاط: منزل خاص تم بناؤه لعرض قدرة التصميم الدوار على توفير إطلالات متغيرة واستخدام الإضاءة الشمسية بكفاءة. يُستخدم كمصدر إلهام لاختبارات الأنظمة الدوارة، لكنه غير متاح تجاريًا كنظام صناعي.

• الموردون

الملاحظات	الموقع	الموردون المحتملون	الفئة
متخصصون في تصنيع قواعد معدنية وقطع غيار	الجزائر	SARL METALPRO أو INDMETAL	الميكانيك
توفر محركات دقيقة عبر الطلب الإلكتروني	دولي / محلي	RS Components Motors DZ	المحركات
حساسات، وحدات تحكم، Arduino / ESP32	الجزائر / دولي	El Moujahid Electronique, SparkFun	الإلكترونيات
منصات للتحكم والربط السحابي	عالمي	Microsoft Azure IoT Blynk, Firebase	البرمجيات

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

المواد الخام	،Condor Industrie Algerian Steel	الجزائر	معادن، لوحات، أدوات تصنيع
خدمات دقيقة	FabLab الجزائر، مخابر جامعية	محلي	لصناعة النماذج الأولية والقطع المعقدة

10- استراتيجيات التسويق

● أولاً: استراتيجية الانطلاق التسويقي (Marketing de Lancement)

- الهدف: التعريف بالنظام، جذب أول زبائن، واكتساب ثقة السوق.
- إنشاء هوية بصرية وواجهة احترافية
- تصميم شعار واسم جذاب للنظام.
- فيديو توضيحي بسيط يشرح الفكرة (Motion Design).
- موقع إلكتروني احترافي + صفحات على مواقع التواصل (Instagram، LinkedIn).
- تنفيذ مشروع واحد أو اثنين "نموذجي" (Pilot) مجاناً أو بسعر رمزي.
- دعوة المعمارين والمستثمرين لمشاهدته.
- حملات إعلانية رقمية بسيطة
- إعلانات ممولة على Facebook و LinkedIn تستهدف مكاتب الدراسات والمطورين.
- محتوى مصور قصير: قبل/بعد، فوائد النظام، تجارب حقيقية.
- خصم 20% لأول 3 مشاريع حقيقية.
- سنة مجانية من التحديثات الذكية والدعم الفني.
- المشاركة في فعالية واحدة على الأقل مثل معرض BATIMATEC أو يوم مفتوح جامعي.

● ثانياً: استراتيجية التوسع التسويقي (Marketing d'Expansion)

- الهدف: الوصول إلى عملاء جدد في مناطق أخرى، وتوسيع الحضور المهني للمشروع.
- فتح قنوات توزيع جديدة
- التعاقد مع مكاتب دراسات أو مقاولين كشركاء/وكلاء في ولايات أخرى.
- تدريب فرق تركيب محلية.
- تقوية التواجد الرقمي
- تحسين ظهور الموقع على (Google SEO).

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- محتوى احترافي على YouTube و TikTok للتوعية والانتشار.
- دخول معارض جديدة وتوسيع العلاقات
- معارض معمارية دولية (BIG 5، Smart City Expo).
- شراكات مع هيئات بيئية أو جامعات للهندسة.
- إطلاق نظام الاشتراك الذكي
- تطبيق خاص بالتحكم مع اشتراك سنوي لخدمة العملاء.
- رسائل متابعة تلقائية، عروض مخصصة للمشاركين.
- بناء سمعة عبر العملاء الحاليين
- فيديوهات شهادات العملاء (Témoignages).
- تقديم مشاريع ناجحة كنماذج مرجعية في كل عرض تسويقي.

المحور الرابع: خطة الإنتاج والتنظيم

1-مخطط الإنتاجي

- الموقع: يقع المشروع في طريق الوادي - تقرت بمسافة 7 كلم عن مركز تقرت بجانب مركز الردم التقني للنفايات ما بين البلديات النزلة

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية



- سبب اختيار الموقع: كان سبب اختيارنا للمنطقة لبعدها عن المنطقة السكنية وكونها في منطقة صناعية، وكما انها أرضية تحت أمالك الدولة للاستغلال ضمن مشاريع الشركات المصغرة بمبلغ رمزي 1دج للمتر مربع.
- الجانب المعماري للمشروع تقدر مساحة المشروع ب 1000م²

المكان	المساحة	الاستعمال
المستودع 1	200م ²	مكان الإنتاج والتصنيع
المستودع 2	150م ²	مكان وضع الآلات
الإدارة	150م ²	خاص بمكتب المديرية والعمال مع مرحاضين وحمامين
مخزن	150م ²	مخصص للمنتوجات الجاهزة للبيع
مخزن	150م ²	مخصص للمواد الأولية
مركز الحراسة	50م ²	مخصص لعمال الحراسة
مساحة مخصصة للسيارات	50م ²	خاصة بسيارات عمال المؤسسة
استراحة العمال	100م ²	تتكون من غرفة استراحة العمال وقت الغداء + حمامين + مصلى

• احتياجات المشروع

الألات والمعدات

اسم العتاد	الكمية	السعر	السعر الإجمالي
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آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

دج 70 000.00	45,000 – 70,000 دج	1	محرك كهربائي DC (0.5–1 HP)
دج 120 000.00	90,000 – 130,000 دج	1	علبة تخفيض سرعة (Worm Gear 1000:1)
دج 200,000.00	150,000 – 250,000 دج	1	قاعدة دوارة معدنية مخصصة
دج 90,000.00	15,000 دج / وحدة	6	محامل تحميل ثقيلة (Heavy Bearings)
دج 35,000.00	25,000 – 40,000 دج	1	لوحات تحكم ذكية (Smart Control Board)
دج 12,000.00	4,000 دج / وحدة	3	حساسات تتبع ضوء الشمس
دج 8,000.00	6,000 – 9,000 دج	1	وحدة تحكم مبرمجة (ESP32 / Arduino)
دج 35,000.00	25,000 – 40,000 دج	1	وحدة كهرباء ثابتة UPS / تغذية
دج 180,000.00	120,000 – 200,000 دج	حسب الحجم	مواد تصنيع القاعدة (ألومنيوم/حديد)
دج 25,000.00	20,000 – 30,000 دج	عدة وحدات	كابلات / توصيلات / لوازم تثبيت
دج 775 000.00	المجموع		

المعدات المكتبية

اسم العتاد	الكمية	السعر	السعر الإجمالي
حاسوب	6	100 000.00	600 000.00
مكاتب	12	10 000, 00	120 000.00
كراسي	14	7 000,00	98 000, 00
خزائن	01	17 000, 00	17 000, 00
مودام انترنت	02	4 000, 00	8 000, 00

آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

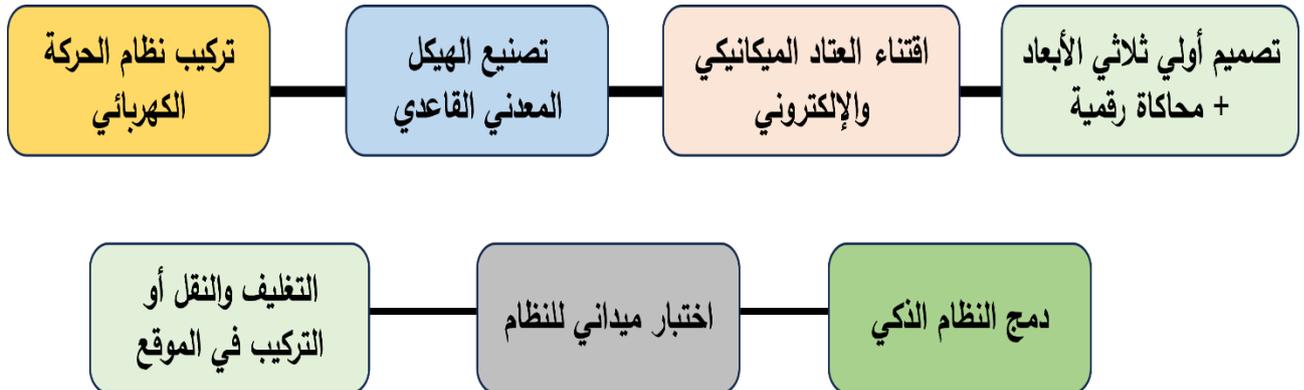
المجموع	دج 843 000.00
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احتياجات الطاقة والكهرباء

الخدمات	احتياجات الثلاثي % الزيادة ب 1%	تكلفة سنة 1
الماء	1600m ³	دج 31200
الكهرباء والغاز	5 00.000 kw	دج 13.000.000
انترنت وهاتف	غير محدود	دج 38.400
صيانة	/	دج 700.000
المجموع	14.469.600 دج	

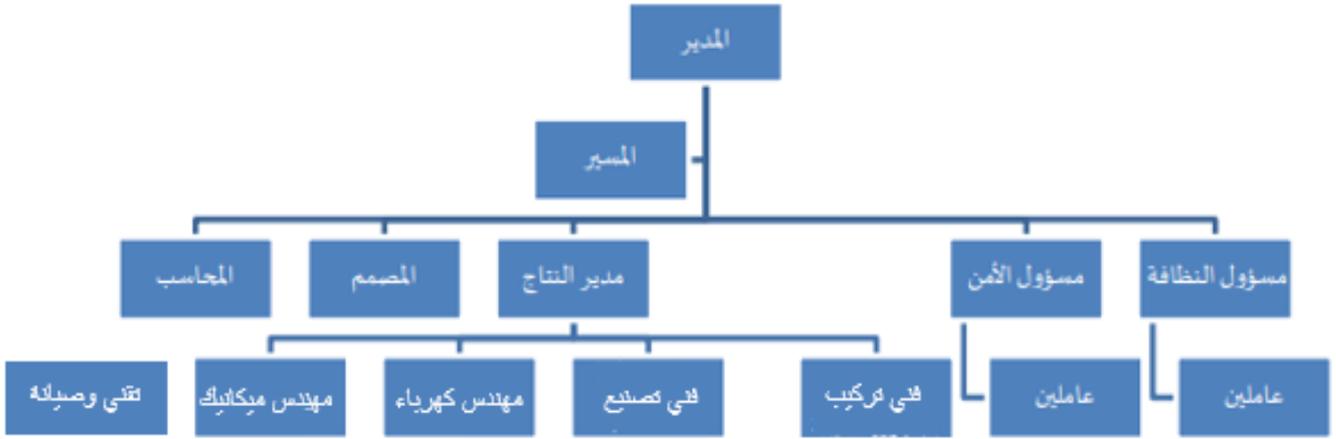
نظام الانتاجي: خطوات الإنتاج

- خط سير تصنيع النظام الذكي للدوران:
- تصميم أولي ثلاثي الأبعاد + محاكاة رقمية باستخدام برامج مثل SolidWorks أو Fusion 360.
- تحليل التوازن والحركة + اختبار تحمل الوزن افتراضياً.
- اقتناء العتاد الميكانيكي والإلكتروني، اختيار مكونات عالية الجودة: المحركات، المحامل، لوحات التحكم.
- قص، لحام وتجميع القطع.
- دمج علبة السرعة والمحامل بطريقة متوازنة.
- ربط المحرك بالقاعدة وتثبيت علبة السرعة.
- تثبيت الحساسات، وحدة التحكم، الاتصال السحابي (IoT).
- برمجة لوحة التحكم الذكية + واجهة المستخدم.
- اختبار الدوران الكامل (360° خلال 24 ساعة).
- مراقبة الاستقرار، الضوضاء، الاستجابة للأوامر.
- تعبئة النظام بأمان وتوجيه فريق التركيب حسب نوع المشروع.



آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

2-المخطط التنظيمي



● احتياجات اليد العاملة

الأجور	الوظيفة	التخصص	العدد	المنصب
50 000,00	التصميم، تحليل الدوران، الإشراف على التصنيع	ماستر هندسة ميكانيكية	02	مهندس ميكانيك
50 000,00	ربط المحركات، النظام الكهربائي، الأمان	ماستر هندسة كهربائية	02	مهندس كهرباء / تحكم
30 000,00	تصميم التطبيق والموقع	ماستر اعلام الي ونكاء اصطناعي	01	مبرمج أنظمة مدمجة (IoT)
30 000,00	تصميم على حسب نوع المبنى ومطابقة المنتج مع المبنى	ماستر هندسة معمارية	01	مهندس معماري
20 000,00	تنفيذ الهيكل المعدني وتجميعه	شهادة معهد	02	فني تصنيع / لحام
20 000,00	تركيب النظام في المشروع حسب المخطط	شهادة معهد	02	فني تركيب ميداني

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20 000,00	دعم العملاء، الصيانة الدورية، تحديثات النظام	شهادة معهد	02	دعم تقني وصيانة (بعد الإطلاق)
380 000,00 ج	المجموع			

• التمويل

ستكون سياسة الشراء كما يلي

- الآلات: تكون مرة واحدة فقط الا إذا احتجنا آلات جديدة فأیضا يكون الشراء مرة واحدة فقط والدفع يكون اما عند الاستلام او عن طريق CCP
- مواد أولية: تكون حسب الطلب في نوعية المنتج
- تجهيزات المكتبة والوازم: تكون مرة واحدة

• الشركاء

الأهمية	الشريك
تمويل المشروع	البنوك
إدماج النظام في التصاميم - التجريب	مكاتب دراسات معمارية
تنفيذ الهيكل المعدني الدوار	ورشات تصنيع معدني محلي
تطوير واجهات التحكم IoT -	شركات برمجة أنظمة مدمجة
مشاريع تطبيقية - اختبارات - نشر علمي	جامعات ومدارس هندسة معمارية
توفير قطع الغيار - التركيب المحلي	موزعون تقنيون
تبني النظام في مشاريع فعلية	شركات بناء مبتكرة
تمويل أولي - احتضان - ترخيص	هيئات دعم الابتكار

المحور الخامس الخطة المالية

1- تكاليف المشروع واستهلاك الاستثمار

• تكاليف استثمارية

التكلفة	الأصول
/	العقار

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775 000.00 دج	الألات والمعدات
843 000.00 دج	الأثاث
/	رأس المال العامل
1 618 000.00 دج	المجموع

• التكاليف التشغيلية

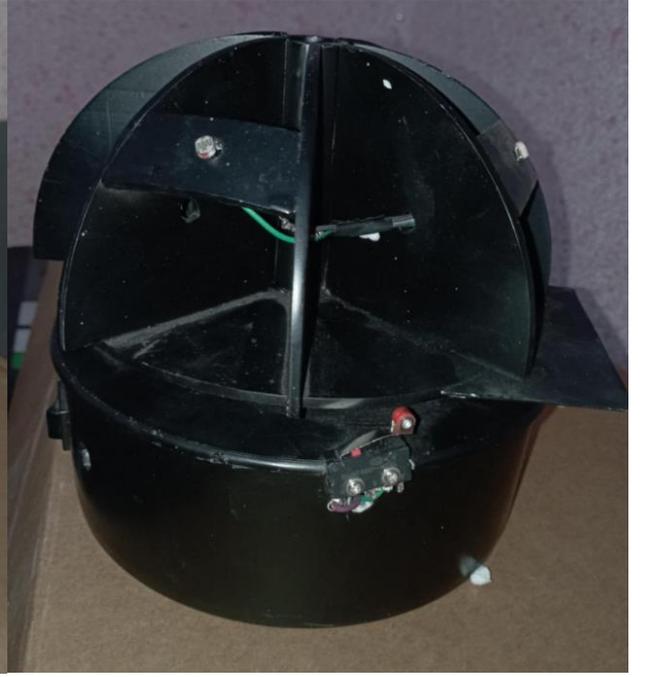
التكلفة	الأصول
380 000,00 دج	الأجور
38.400.00	الهاتف والانترنت
13 000.000.00	الكهرباء والماء
13 418 400.00 دج	المجموع

• تقدير المبيعات

العن	يناير	فبراير	مارس	أبريل	مايو	يونيو	يوليو	أغسطس	سبتمبر	أكتوبر	نوفمبر	ديسمبر	المجموع
2026 (60%)	6900	13200	20100	26700	33600	40200	47100	53700	60600	67200	74100	80700	80700
2028 (70%)	8050	15400	23450	31150	39200	46900	54950	62650	70700	78400	86450	94150	94150
2029 (80%)	9200	17600	26800	35600	44800	53600	62800	71600	80800	89600	98800	107600	107600
2030 (90%)	10350	19800	30150	40050	50400	60300	70650	80550	90900	100800	111150	121050	121050
2031 (100%)	11500	22000	33500	44500	56000	67000	78500	89500	101000	112000	123500	134500	134500
	مجموع المبيعات خلال 5 سنوات												672500
	سعر المبيعات خلال 5 سنوات												20,175,000,000 دج

المحور السادس النموذج الاولي التجريبي :

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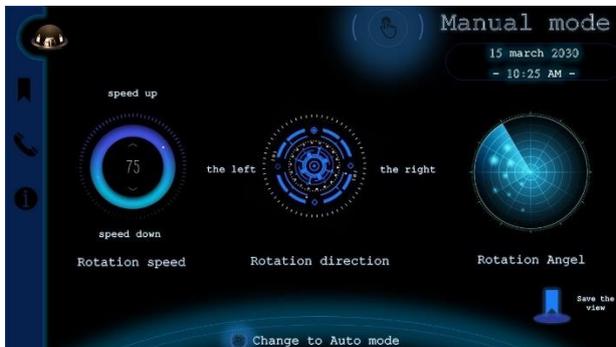
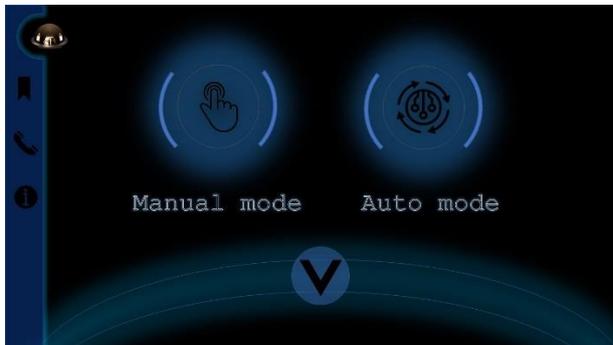


آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية

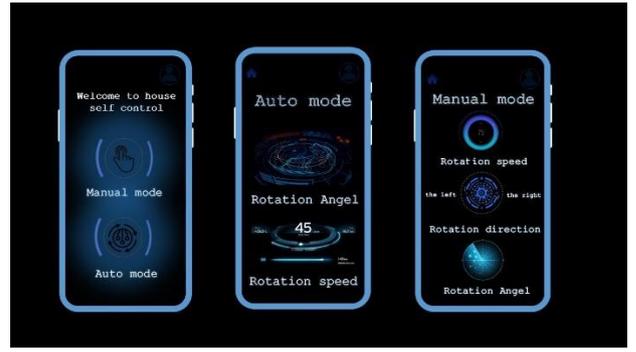
```

roumaissa-Dome | Arduino IDE 2.3.5
File Edit Sketch Tools Help
roumaissa-Dome.ino
1 #include <Servo.h>
2 #include <Wire.h>
3 #include <LiquidCrystal_I2C.h>
4
5 // LCD I2C
6
7
8 // الحركة
9 Servo myMotor;
10
11 // LDRs
12 const int
13 const int
14 const int
15 const int
16
17 // أزرار
18 const int
19 const int
20 const int
21 const int
22 const int
23
24 // المتحريك
25 const int
26
27 // التوقيت
28 bool
29
30 // حالة الحركة
31 enum
32
33 bool
34
35
36 void setup() {
37   Serial.begin(9600);
38   myMotor.attach(motorPin);
39
40   pinMode(btnAuto, INPUT);
41   pinMode(btnManual, INPUT);
42   pinMode(btnRight, INPUT);
43   pinMode(btnLeft, INPUT);
44   pinMode(endStop, INPUT);
45

```



آلية دوران ذكية للمنازل حسب أشعة الشمس و المناظر الطبيعية



<p>الشركات الرئيسية</p> <p>البنوك شركات التوصيل مكاتب دراسات معمارية ورشات تصنيع معدني محلية مبرمجون وشركات برمجيات IoT جامعات هندسة معمارية وتجريبية مورّعون تقنيون محليون</p>	<p>الأنشطة الرئيسية</p> <p>تصميم النظام الميكانيكي والبرمجي تصنيع وتجميع القاعدة الذكية تطوير التطبيق التركيب، التكوين، وخدمة ما بعد البيع</p> <p>الموارد الرئيسية</p> <p>الألات المواد الاولية العمال المصنع</p>	<p>القيم المقترحة</p> <p>منتج معماري ذكي متحرك وفريد من نوعه تحسين الإضاءة الطبيعية وكفاءة الطاقة تجربة سكنية مخصصة وديناميكية</p> <p>تصميم قابل للتكامل في مختلف المشاريع</p>	<p>العلاقات مع العملاء</p> <p>دعم فني مخصص بعد البيع تطبيق تحكم ذكي + تحديثات دورية تواصل مستمر عبر البريد والتطبيق عروض وفوائد خاصة للعملاء الأوائل</p> <p>القنوات</p> <p>اعلام مقابلة وسائل التواصل الاجتماعي معارض معمارية وسياحية (...BATIMATEC) شركات التوصيل نقاط البيع</p>	<p>شرائح العملاء</p> <p>مكاتب الدراسات الهندسية والمعمارية شركات البناء والتطوير العقاري مستثمرون في السياحة البيئية والفندقة مشاريع أكاديمية وتجريبية للابتكار المعماري</p>
<p>هيكل التكاليف</p> <p>تكاليف ثابتة: تطوير النظام- شراء المحركات والمكونات- إعداد النماذج الأولية- أجور الفريق الفني</p> <p>تكاليف متغيرة: الصيانة والدعم الفني- التسويق والترويج- تحسين الواجهة البرمجية- تكاليف التركيب والتشغيل الميداني</p>		<p>المصادر والإيرادات</p> <p>بيع النظام كمنتج تقني نهائي- ترخيص التكنولوجيا لشركات أخرى- اشتراك سنوي في خدمات المراقبة والتحكم الذكي- خدمات الصيانة والدعم الفني- تخصيص النظام مقابل رسوم إضافي</p>		