Sustainable and Cultural Architecture

Topic:

Research Processes That Leads to Designing My Own Sustainable Futuristic Building Based on A Certain Style.

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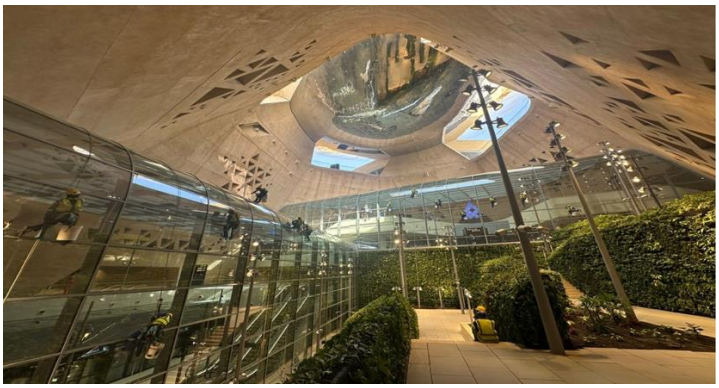
Architecture is the science and art of design structures, and buildings, incorporating both the processes of planning, engineering and the final product blending creativity with technicality to create spaces with functionality and an exceptional and aesthetically pleasing look. The following research paper highlights the processes of planning to design a culturally significant, iconic and historic building but adding a modern and sustainable touch. The research paper will start with narrowing down the worlds best architectural buildings that combine culture, local architecture and architectural tactics into their modern design, this step helps find tactics and ways that the architects used to draw inspiration from. Secondly the research paper will delve into the ways and processes of design finding the best ways of design for beginners, within that the search for suitable materials that fit the criteria of being suitable for a hot dessert environment and that are self-sustaining and ecofriendly within that building, after that the search for traditional Arabic and Islamic cooling and architectural tactics that are suitable for the building space and area that I'm designing. The last part of the paper will go into the process of combining culture and modern architecture design details and simple ways that show cultural appreciation and honor ship in my design, as a beginner in the world of architecture learning new terms used by professionals will help me understand design and the architectural world better also have a new definition for architecture. We will be exploring all what I mentioned in detail by the following research paper.

What are the Best architectural buildings worldwide that combine culture and local architectural designs specifically Arab / gulf culture? And which ones am I drawing inspiration from?

Main Building Inspiration:

The Qasr Al Hokum Downtown Metro Station



A cultural and transportational hub located in the heart of Riyadh the qasr al hokum metro a meeting between two metro lines but also between two worlds, this station literally mirrors the city's historic sites by a 70 meter diameter stainless steel cone - shaped roof that reflects the sight into the interior of the station, while reflecting the city's modernized architecture to the outside. The interior was designed to be a link between local culture using traditional Arabian architecture with modernity technology and sustainability by using natural ventilation tactics which are commonly used in Arab architecture. Located at the base of the station is a garden filled with local plants creating a serene area for passengers to wait in or a peaceful area to rest. This station acts as a unifying part of the city, linking the cultural and traditional part of the city with the modern and urbanized part of the city.

1. Local elements that the building incorporates:

- Local materials: The station uses locally sourced natural stones and sand colored concrete, presenting the tones of Riyadh's traditional architectural styles.
- Cultural patterns: The windows, screens, and carved walls are shaped in a traditional Nadji style geometric design, inspired by houses and buildings in the surrounding area.
- Locally inspired climate efficiency: using local tactics like protecting the interior form sunlight and adding Islamic style window panels to increase air flow inside, and allow natural cooling to decrease energy usage, showing that modern buildings can be energy efficient by using old cooling tactics.

Liwa Farm Village

Liwa Farm Village is an agricultural land which is a set of buildings in an active date plantation, located in Liwa, Abu Dhabi, a small village on the edge of the Rub ‘a Al Khali (The empty quarter). The farm has a strong regional culture influence as it uses clay and wooden latticework, earthen walls, and palm-based structures to direct wind into wind-catchers to increase natural airflow to keep it sustainable and eliminate energy usage. The building has an important usage for the traditional water irrigation system that is called “The Aflaj irrigation system”. What is this system? Well, this system is reinterpreted in the design. It is designed as narrow water channels, and those channels flow around the building, specifically, courtyards and walkways. Those channels help a lot, especially with cooling its surroundings naturally through evaporation. Not to mention, this is highly similar to how the traditional Aflaj network has moved underground water from one place to another (water to farm and villages). Using this ancient technique in a modern way not only does the project maintain sustainability, but it also reduces a lot of heat, while celebrating the heritage of desert innovation in such contemporary context.

Local elements that the building incorporates:

- Use of natural local material: The building is made of clay, earth, and locally sourced stones and palm-based structures connecting it with traditional Emirati and deserts design and construction

- Wooden lattice work: Using Islamic lattice work that provides shade and filtered light to enter the building reducing heat while keeping connection with surroundings

- Water irrigation channels: Using traditional cooling systems that direct the wind throughout the interior of the building to increase air flow and reduce energy waste and usage
- Reflecting the landscape and local architecture: The building sits within a date of plantation blending the building with agriculture. Therefore, preserving the connection with local farming traditions and culture.

Fass School and Teachers' Residence

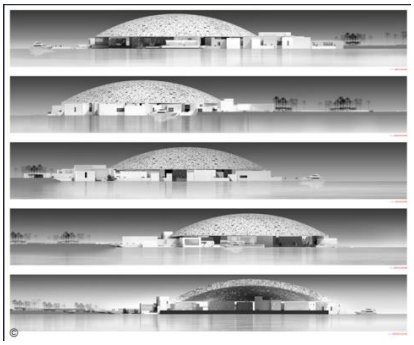
A school located in Fass, Senegal, it was designed by Toshiko mori architecture firm, in collaboration with the Josef and Anni Albers Foundation an American nonprofit supporting education and culture in Senegal also with Le Korsa a Senegalese organization that helps local communities with healthcare and education, the building plays an important role in offering education to a group of 110 villages, who lack any formal education opportunities, blending local teaching techniques with modern teaching practices. The collaboration between local and international organizations is reflected on the design of the building, with blending modern, sustainable architectural concepts, with traditional Senegalese architectural methods and materials, creating a building that is innovative versatile and rooted in the community.

Local elements that the building incorporates:

- Traditional design: The design in inspired by local Senegalese homes that have their rooms built around an open courtyard in the center.
- Local materials: the building uses mud bricks, bamboo and thatch all sourced from the local area, so it can fit with the surroundings.
- Local builders: builders who work all around the villages were used to preserve traditional methods, so they can also have easy fixes without requiring outside sources.
- Climate friendly design:
    - The thick thatch roof and mud brick walls help naturally sustain a cool internal temperature.

    - The white painted walls help reflect the sun's heat.
    - Small openings increase air flow efficiency inside the buildings.
    - The use of natural cooling tactics helps limit the use of energy and present the cultural architecture of the area.
    - The school's function and form use local, modern sustainable tactics with a local traditional touch.
- Rainwater control: the steeply set 45° roof that directs rainwater to nearby groundwater channels.

Louvre Abu Dhabi



The louvre Abu Dhabi is a museum and gallery located in Saadiyat Island, Abu Dhabi. The museum was designed to be a colossal but welcoming space by combining shadows, lights, and showstopping architecture. The building was set to belong to a country and reflect its history and geography but without being a full-on mirror to the country itself, so they aimed for it to show that it belonged to the country interestingly and unconventionally. The architect was inspired by the surrounding area utilizing it as inspiration for his building, he created a symbolic relationship between the see and land by making the layout of the museum imitating an archipelago (a cluster of islands), with a set of 55 buildings surrounded by the Arabian gulf waters, creating a seamless connection from the surrounding environment to the museums interior, what's interesting about this is it allows visitors to travel by boat or water to the museum. The Louvre Abu

Dhabi's dome is one of the most eye-catching, breath-taking parts of the design. It has a big representation on unity to the Arabs and the Arab culture. Also, architect Jean Nouvel has reimagined this idea not in a basic way, but in a modern way instead. The massive dome has been created in a way that uses thousands and thousands of metal stars; to imitate the use of palm trees and branches in traditional Arab culture as a way for shade and cooling in houses and public areas, the dome offers a creation of a stunning "Rain of Light" effect which in that case sunlight passes through it. Not only that, but it also provides shade and natural cooling, which helps the building stay more comfortable; therefore, it uses way less energy as well. The dome appears to float above the museum, which in that case shows the mix of art, culture, and technology. Overall, the design connects to many factors. Which includes nature, tradition, and innovation. With that, it makes the Louvre Abu Dhabi a true symbol of the UAE's cultural identity while also including a futuristic touch.

What is the best way to design my architectural building? What are the best materials and tactics for a sustainable and ecofriendly building?

In the process of designing my building I'm going to focus more on the exterior and interior design aspects of the building rather than a full architectural design as it is a “concept” drawing since it's not based on a real location or function. This would be narrowing down what I will be using to turn my concept into a building.

The process of designing my building:

Sketching:

Materials:

Sketching is an extension of an architect's creativity reflecting their vision onto paper, but having the right material helps you print your vision exactly from your mind onto paper, in a career path where every line curve and dot matter the materials matter to get precise measures.

1. A Canvas (sketch book / paper):

Best types of paper:

- Tracing paper: Tracing paper offers transparency for an easy overlay to transfer clean lines and detailed sketches; it has a multitude of uses for sketching.

- My goal for an ideal sketchbook is for it to be:

    1. bleed proof: for painting over my sketches or for using markers to make sure that what I'm using doesn't bleed through to the other papers.
    2. Compatible to Watercolor, paint and colored pencils
    3. Durable and high-quality paper (the thicker the better)

Best notebooks for artists:

Moleskine Watercolor Sketchbook:

A sketchbook trusted by most architects as a go to notebook and sketchbook to write down ideas plans and more.

Pros & Cons:

Pros:

1. Durable fashioning: the sketchbook is sewn to perfection with a very durable hard cover, which is ideal for travel, regular use and working on site.
2. The sketchbook lays flat, which makes it very easy to work with, especially for architects since they mostly work on double spread pages.
3. Versatile: the sketchbook can be used for a plethora of drawing coloring and painting types like ink, marker, pencils, and gauche. Great for mixed media sketches.

Cons:

1. Low paper quality: the paper cannot handle watercolor completely as it causes issues of bulking and color lift, which disturbs the sketching processes.
2. Varying texture: reviews are reports stating that sheets have different qualities and sizes throughout the sketchbook even on the same exact sheet which disturbs the painting process and application.
3. There is less vibrancy in colors because of the off-white color of the paper which affects the pigment of markers and watercolors.

Stillman and Brin Zeta watercolor Sketchbook:

A go to sketchbook for artists painters since its less of a portable sketchbook it is used by artists as a strong and dependable sketchbook for painting

Pros & Cons:

Pros:

1. Versatile: the sketchbook can be used for a plethora of drawing coloring and mixed media, painting types like ink, pencils, and gauche. Great for mixed media sketches.
2. Smooth and pure white paper: the paper is hot pressed and 100% cotton which makes it one of the smoothest paper choices and the bright white color helps the colors show and pop more.
3. Stable surface: the sketchbook lays fully flat, which helps with double paged sketches, and both sides of the paper have the same consistent texture. The paper is acid-free, which makes the artwork last longer on paper.

Cons:

1. Ink bleeds: ink from some markers that have a heavy ink flow might bleed through the paper.
2. The paper might pill up (little pieces of paper) when it's rubbed hardly specifically when mixed media is used.
3. Quality control issues: some reports have shown manufacturing issues with some sketchbooks appearing to have smudges lines and ink on the paper.

My Choice:

The sketchbook I have chosen is the second sketchbook (Stillman and Brin Zeta watercolor Sketchbook) as it offers more versatility 100% cotton paper which makes it more reliable that the other sketchbook, and its priced reasonability compared to the first choice as it offers more features than the other one while being in the same price range.

Pens and Pencils:

1. Prima micron pens: these pens have a plastic tip shaped like straw to create consistent ink flow with minimal spillage which lessens bleeding through the paper.
2. Rotring mechanical pencil: a hexagon shaped mechanical pencil which helps with consistent lines and reusable body reduces waste compared to

regular wooden pencils; the hexagon shape helps stability in tables preventing it from rolling down.

3. Sakura Koi Watercolor palette: a great and efficient way to use watercolor with it being one of the top watercolor products with vibrant dull and a variety of different colors.

Sustainable materials for my building:

Solar Windows: windows that basically have solar panels built in; they are just like regular windows, but they have a glazing over them which converts sunlight into energy. During daily hours, the sunlight that is directed towards the window is converted into a usable, renewable, and efficient energy source for the building, for any result of excess energy can be stored in a solar battery located in the building.

Benefits of having solar windows:

- Reduces Heat: during the summer temperatures rise as much as 45 degrees Celsius, this is very beneficial especially in a desert climate where heat is very strong, these windows help with heat reduction inside the building.
- Blocking UV Rays: solar widows help prevent ultraviolet rays from entering the building.
- Cheaper and more efficient than solar panels, as these solar windows have 15% efficiency which may seem relatively low, but they are more efficient than the average solar panels in the UK and The Arabian gulf, since this is measured by houses this would be much higher in a big building facing direct sunlight.

Natural tactics

This tactic is mostly used in Islamic architecture commonly in countries like; Saudi Arabia, Syria, Morrocco, Egypt, and Iran:

Courtyard cooling tactic: a courtyard placed in the center of a building that serves not only the house's social and cultural life but also functions as a natural environmental system to cool and brighten the house. In hot climate areas, it acts like a natural control of the climate, creating a comfortable climate for the building. The courtyard works mainly as an open-air area and offers simple design methods that do not rely on energy pleading systems to promote cooling. The open-air design creates a place for daylight to enter the house with comfort, without harsh sunlight, while the enclosed courtyard also protects occupiers from

hot winds and distracting noises that can interfere with everyday life. Altogether, the balance of daylight and shade along with airflow allows the courtyard to serve as the "breathing core" of the house through a highly simple and passive design.

The process of cooling a courtyard includes a combination of various natural effects. In the first place, the stack effect enables warm air to rise and exit to the upper areas, therefore drawing in cooler air from shaded rooms and lower openings, creating a mild and continuous breeze. The height of the surrounding stone or brick walls blocks much of the direct sunlight, hence shading the courtyard. Additionally, many courtyards contain fountains or planting to cool the air through evaporation or transpiration to make the courtyard more comfortable. At night, the adjacent thick stone or mud-brick walls release the heat absorbed during the day to further cool the entire structure by this process. This continuing process of heating and cooling provides natural ventilation and thermal equilibrium to the house all day long.

In summer, air temperatures in the courtyard can be approximately 4-8°C cooler than outside air temperatures. Gentle air movement in the courtyard usually has a velocity between 0.5 to 1.5 meters per second. The presence of water features will raise the humidity slightly by approximately 5-10%, which will also improve comfort.

How can I combine culture with architecture design? What are the terms used by professional architects? And what materials will I use for my model?

In a search for finding ways to combine culture with modern and new architecture, a lot of architects don't really take surrounding culture into consideration but the greatest do, and combining local culture can happen in a couple different ways how I'm doing it are these following techniques:

- Work With Local Builders and Artists: collaborating with the local community will help ensure that said project has authenticity and a local touch to it, as these local artists, builders and suppliers have centuries of traditions and methods that are not found anywhere else. In the Fass School and Teachers' Residence building that I mentioned earlier, the use of local builders and materials was prioritized which made the building have authenticity and for it to blend in with the local buildings and architecture.
- Using local materials: an important part of cultural architecture and architecture in general is the use of local materials; the use of local material enriches the building as it combines modernity and traditional

ways. The implementation of local materials blends in the building with the environment showing a sustainable design that has traditional roots, harmonizing the design with its natural surroundings, creating authenticity, therefore also creating a sense of place.

- Using traditional architectural techniques: the use of traditional architectural techniques that belong to that area will contribute to the preservation of tradition instead of making them forgotten by facing globalization. Traditional architectural techniques are often self-sustaining which is what helps it blend with local and modern architecture as most architects strive to have sustainable buildings, the approach of using these methods pays homage to the importance of cultures and the ancestors of that area, it shows that “old is gold” and that tradition isn't always outdated. The use of these local methods with the help of available resources such as local materials, the use of these resources helps the building harmonize, connect and fit in with the local environment, making it an authentic representation of culture.
- Incorporating cultural practices and motifs: by intertwining traditional motifs that are found in textiles, carvings and old buildings can create and aesthetically celebrate tradition and history contemporarily. Creating spaces in the building that cater to the traditional and cultural practices of this area like local parties, festivals and rituals, this honors the local cultural practices making them celebrate their culture in a place that’s honors theirs.

15 terms used by professional architects:

- Passive design: using natural resources and tactics to regulate lighting and temperature.
- Atrium: an open space in the middle of a structure often seen in big buildings.
- Façade: the front of a building often showcasing its aesthetic and decorative elements, widows, motifs and structural elements.
- Zeitgeist: a German word for “spirit of age”, this word is used by architects to describe the architectural trends, moods, attitudes and cultural impacts of a certain era of time.
- Hegemony: a building with a purpose of asserting dominance, authority or influence. This is achieved by having an important location also a striking and dominant style
- Pistache: a building design that imitates the style of past eras and styles or combining different historical styles in one design.

- Tectonics and architectonics: this term emphasizes the art and science part of architecture, focusing on how a building showcases its structure materials and the assembly that are shown visually in the building.
- Nuance: small elements and difference in a design that make a more complex, sophisticated, or a specific feeling or function. Like color, object arraignment, material or lighting to create a specific sense or feeling for that area or building.
- Public realm: the public spaces that are accessible to the general public like streets, parks and more public or outdoor areas. This is used to design a good and stable environment for social public interaction throughout the city.
- Transient: a temporary or an easily transported structure that were designed to stay for a limited amount of time, these are made to create social experiences throughout public realms like pavilions, parks and even private realms like art galleries and exhibitions.
- Amalgamation: the processes of combining and uniting different elements creating one cohesive part. This can either be physical like a bridge connecting two buildings or an apartment building turned into one big home, it can also be conceptual like combining different design elements into a one project, lastly materialistically like using multiple local materials to create a unique structure.
- Bottom Up/Top Down: these are two different approaches for design, the first one designing from the bottom up is a design approach of starting with the small part or details first and then turning it into a large scale building, the top down approach is the opposite with first creating a larger design or system and then going into the small details of the design
- Metaphor: a metaphor in architecture is used to interpret meaning into a building or a design, for ex; The Palm Mosque which is based on the shape of a palm tree
- Taxonomy: a system used my architects to classify and organize concepts, style and design components.
- Phenomenology: it is how spaces and buildings are adept by people through their emotions and senses. This is more than design this is going into the details like material lighting and more for it to affect a person’s emotions through their life experience.

In essence, architecture plays a vital part in history as it shapes our understanding of history and culture throughout historical designs and buildings. Throughout this research as a beginner, I have discovered devices and ways to express oneself, and one's culture through design and architecture. Exploring and finding culturally rich buildings embracing peoples culture creating a welcoming and nurturing space for those people to have pride in a building embracing who they are, helped me understand how vital culture is in architecture. By finding natural cooling and lighting tactics it showcased the importance of architecture in history, it also showed me that "new" "modern" and flashy things are not always the best taking a step back looking at history is always a great thing embracing culture is always great as architects strive for sustainability looking at history helps us find ways of sustainability without modern technology using the old and repurposing it into the new world, but you can also have it as a mix of history and modernity as modern technology can also work with the historic ways to help sustain and ecofriendly building.