

Stoane Lighting Visit

Stoane Lighting is a lighting design and manufacturing company based in the United Kingdom. Specializing in high-quality architectural lighting solutions, Stoane Lighting is known for its innovative designs that seamlessly blend aesthetics with functionality. The company offers a range of lighting fixtures, including exterior and interior luminaires, with an emphasis on sustainable and energy-efficient solutions. Stoane Lighting's products often feature contemporary designs that cater to both residential and commercial spaces.

Upon our visit at **Stoane Lighting** last Friday, I was left with a deeper understanding of what lighting can truly do for a space. Seeing the myriad of fixtures and lamps, lanterns and chandeliers and the time and research that goes into creating each of them, really put things into perspective for me. I was impressed by the scale of the projects they have worked on, as buildings such as **St Paul's Cathedral, Westminster Abbey, McEwan Hall or Harrods** are part of their resume. It was extremely insightful to see the design process behind an object and then seeing it come to life. Furthermore, I never realised how many people and different expertises are needed to complete a lighting project. Just within the firm, there were lots of employees, all with varied specialisations. Their work ranges from tiny light fixtures to grand, heavy chandeliers, thus, they cater to all necessities.

For example, I found the lighting process for McEwan Hall very impressive, as the massive chandelier is their heaviest project to date, standing at 350 kg. The installation process was a laborious one as it took more than 40 hours. The entire project was incredibly meticulous, as changing the original,

traditional luminaires inside the chandelier (Metal Halide) to LED engines (integrated assembly composed of one or more light emitting diodes (LEDs) or LED arrays) took a lot of care and precision.

This visit was a very important one, as it broadened my horizons in terms of the possibilities within the design world.

Sources:

Fig1: McEwan Hall- www.edinburghphotowalks.com

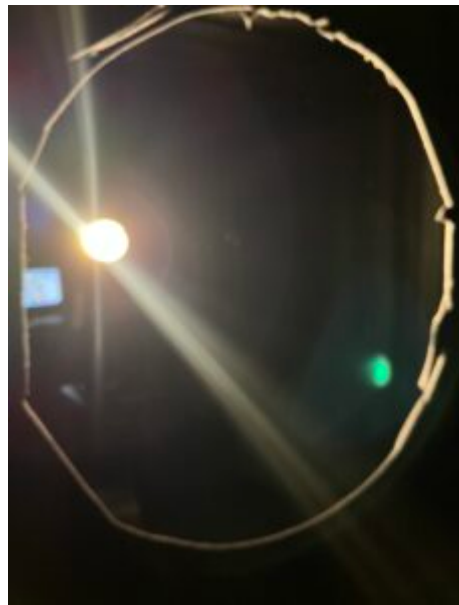
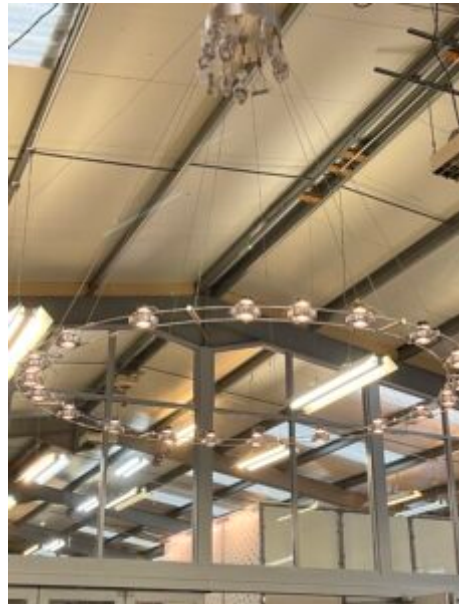
Stoane Lighting Site Visit- photos taken by me (Daria).

www.stoanelighting.com

Williams, E. W. & Hall, R. (1978) *Luminescence and the light emitting diode / by E.W. Williams and R. Hall*. New York: Pergamon Press.

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Week 7 Lighting Exercise- Piano Recital Space

*Following the lecture, we had a fun task to do in class. In groups, we had to redesign the same space but in regard to different purposes or utilities. For example, my group was supposed to redesign in regards to the idea of a **piano recital space**. We made two plans, one showing the new layout and one showing the light distribution. Thus, we had to think of ways in which we could highlight the stage and the piano best, whilst also making sure the pianist would not be positioned in unflattering light. We also chose different words that could give clues as to what we had to redesign for. As we were all trying to guess what everyone did, I understood the significance of being very clear and concise in your design, making sure that your intentions are presented clearly. We also had to calculate the light factor for different scenarios. In all honesty, I did not pay enough attention to the way designers use light before, however, throughout all of*

these exercises I have been learning so much about how quintessential properly and effectively using light is for any interior.

After working together with my group, we wrote down various ways in which the space would be lit to its full potential:

Using adequate lighting Ensure that the entire performance area, including the piano, sheet music, and the performer, is well-lit. Use a combination of ambient, task, and accent lighting to achieve balanced illumination. Avoid harsh shadows that could distract the performer or the audience.

Directional Lighting: Using spotlights or track lighting, to highlight the performer and the piano. This helps draw the audience's attention to the focal point of the space .

Colour Temperature: Considering the color temperature of the light sources. Neutral and warm color temperatures are often preferred for performance spaces as they create a welcoming and comfortable ambiance. Overly cool tones that might appear clinical or unwelcoming should be avoided.

Controlling the Glare: Since the piano and its keys are quite glossy, figuring out a way to get minimal or no glare at all is essential for a successful lighting project for a piano recital designated space. – overhead lights should be avoided, usage of dimmers and anti-glare coatings is recommended.

Making the most of the natural light: the space that we were given is fully surrounded by floor to ceiling glass windows, thus, there will be almost no need for artificial lighting during the day, yet, at night-time, the space would need to be carefully lit, as the glass would not allow for light to reflect or properly propagate.

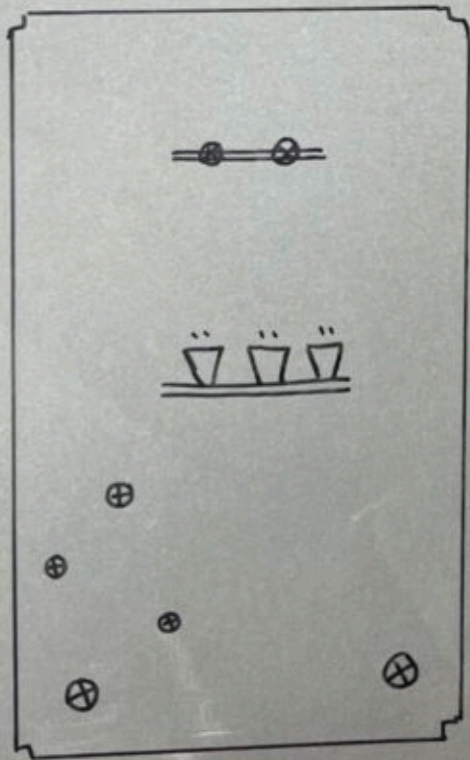
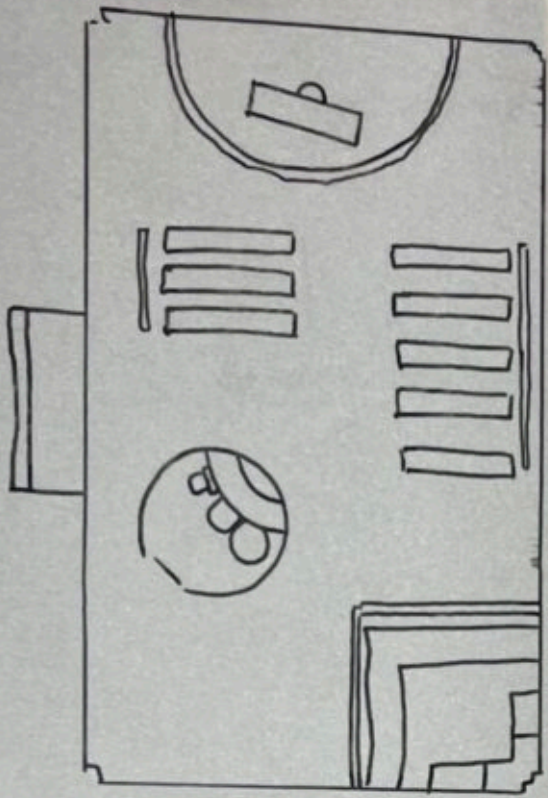
The goal for such a demanding space, in terms of lighting is to provide adequate and even illumination without causing discomfort or distraction for the pianist. By combining a

variety of strategic ambient lightings, a glare-free environment, appropriate for focused and enjoyable piano performances, would be created.

Sources: Fig1: Piano Lighting- audiophile-musings.blogspot.com

Fig2- Plan drawn in class- Photo take by Eve





Lighting exercise- trying different filters

*Last Friday, we had a lighting professional come to class and present us a plethora of lighting methods, all serving different purposes. I found the LED light interesting, as I did not know that its initial state, before the phosphorus is added, is a violet shade. We took light measurements in class and lots of photos, as we were trying out various temperatures and intensities. One combination of lights in particular reminded me of **James Turrell's** work. His work has always fascinated me, as I find it truly outstanding how his work can evoke so much emotion only through the use of light and colour. This exercise made me understand how vital light is for any interior and how depending on how much or how little amount or the tone of the light, the space can obtain an entirely different meaning.*

Thus, in this blog post I would like to get into depth about James Turrell's work and the genius behind it, as, with solely the use of light, he is able to convey such strong emotions and receive such strong reactions from the observers and art critiques. A pioneering artist in the Light and Space movement, is renowned for his transformative exploration of light as a medium in his artworks. Turrell's installations, often described as perceptual experiences, manipulate light to elicit profound emotional and spatial responses. Turrell meticulously orchestrates natural and artificial light, using LEDs or neon tubes to create immersive environments that challenge conventional notions of space and vision. The artist's work is not merely about illuminating spaces; it's about shaping the way viewers perceive and engage with light itself. Turrell's installations invite contemplation,

encouraging viewers to appreciate light not just as an aesthetic element but as a dynamic force capable of transcending the visual and evoking a visceral, almost spiritual, response. In Turrell's hands, light becomes a sculptural material, almost tangible, a tool for a deeper connection between art, observer, and the surrounding environment.

James Turrell showcases a variety of luminaires and lighting technologies in his artworks to achieve specific effects and manipulate the perception of light. Some of the most prevalent types of luminaires and lighting elements used in Turrell's installations include: LEDs, neon lights, fluorescent lights, fiber optics and, at times, natural light.

His work is truly revolutionary, as he is a pioneer in contemporary art, in the light and space domain specifically, as he broadened the possibilities for artistic engagement with light through his innovative ideas. He is and will continue to be a visionary in his domain and an example for future artists.

Sources: Fig1: James Turrell artwork- news.artnet.com

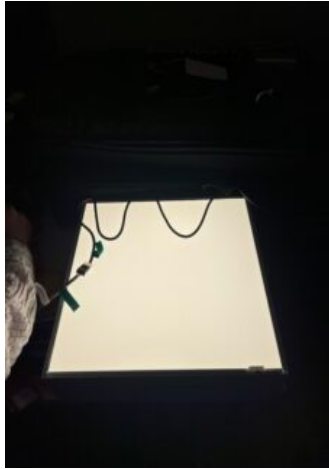
Photos of light exercise- taken by me (Daria)

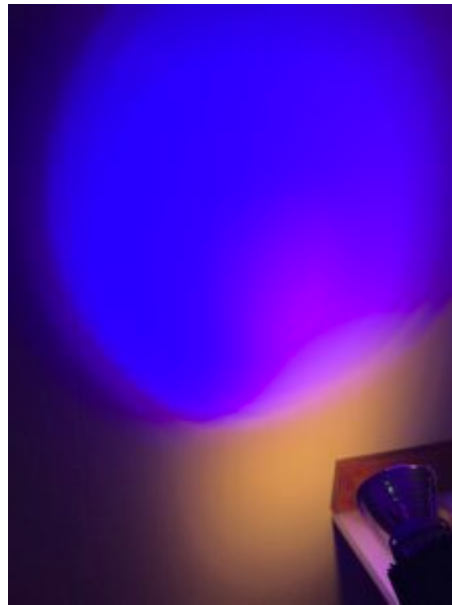
Govan, M. et al. (2013) *James Turrell : a retrospective / Michael Govan and Christine Y. Kim ; with essays by Alison de Lima Greene, E.C. Krupp ; featuring photography by Florian Holzherr*. Los Angeles, Calif: Los Angeles County Museum of Art.

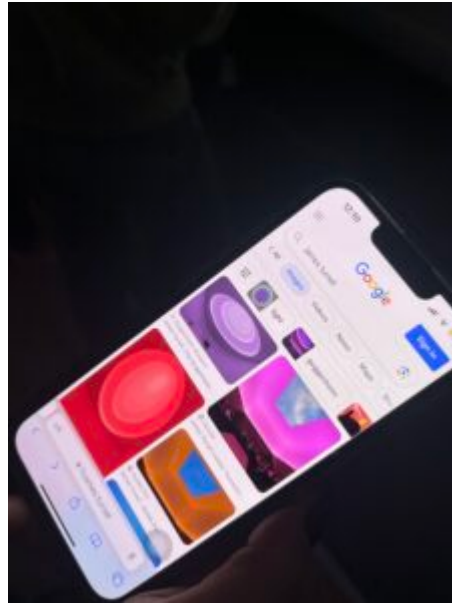
Peifer, D. (2013) *Lighting lessons from an artist: James Turrell's Guggenheim exhibition plays with perceptions*. Vol. 54. The Nielsen Company.

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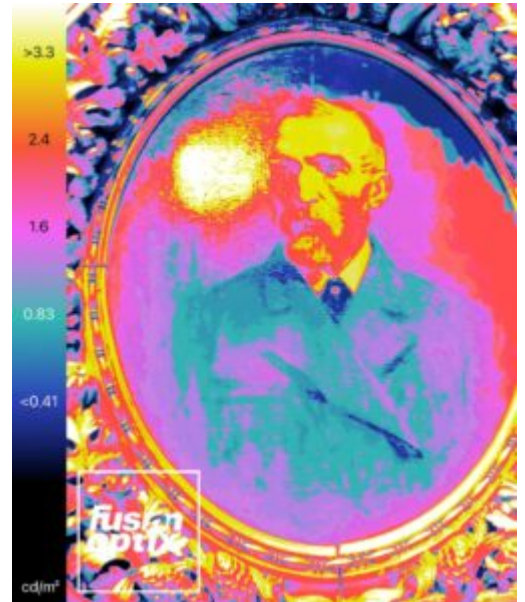






National Portrait Gallery Visit

My visit at the **National Portrait Gallery** was a wonderful experience, that provided me with great insight into the world of lighting . The various rooms in the gallery showcase a mixture of lighting methods, as some displays of art are artificially lit, some are benefiting from natural daylight and perhaps sunlight, although I did not get lucky in terms of the weather, whilst other rooms are both artificially and naturally lit. I found it really interesting how certain ceilings were open, with a glass square in the middle that could be left open or covered. I went on a gloomy day, thus the covers were shut, as the light outside was too harsh. I can imagine that on a sunny day, the ceiling is open and there is barely any need for artificial light. I find it that if we were to consider each painting individually, sunlight creates the most beautiful effect, as for example in oil paintings, all the brush strokes and small details are on full display and more visible than ever. Unfortunately, sunlight or daylight in general are hard to manage and control, as the light is constantly moving throughout the day. Thus, I believe artificial light can be the optimal solution in order to give



equal attention to all artworks.





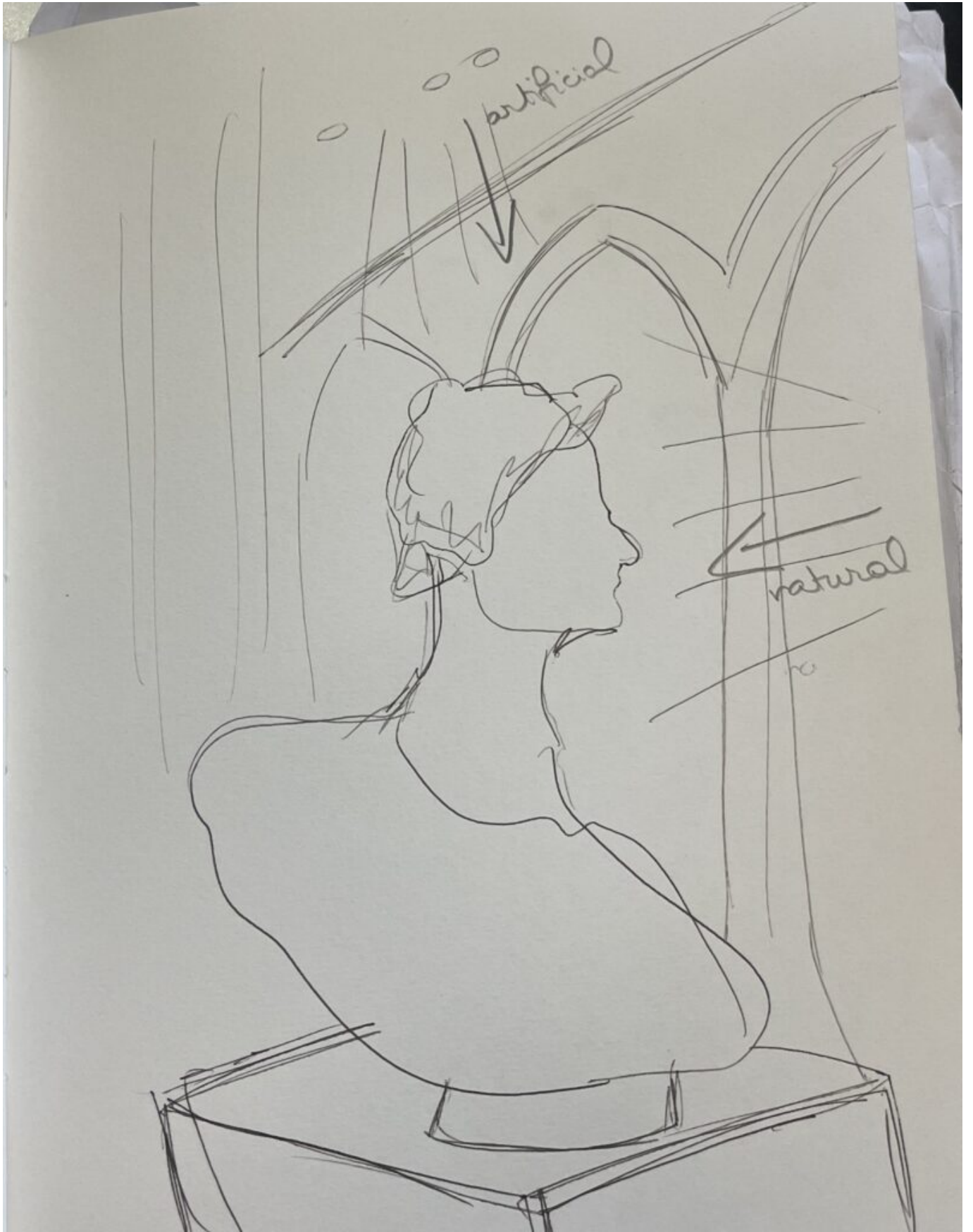
In the first drawn room, the artificial light is white and harsh and it does not create a warm, cosy environment that would be needed for a library. However, the other drawn room is lit by hanging lanterns, that with the help of red glass, diffuse the light in such a way that it gives a warm effect. The floors and walls have an important role in creating the overall feel of the space in terms of light, as, the dark wooden floors and the dark walls in the library create a



colder feel, whilst the light stone floors and the red brick walls in the main hall create a warmer palette overall

The National Portrait Gallery is a space where an array of different luminaires are used in a very enchanting and effective way, as, when it comes to the main hall as you first walk into the building, you are left in awe.





Sources: photos- from site visit at National Portrait Gallery-

taken by me (Daria).

Lighting exercise- sun dial, latitude

Last Friday we did a series of really interesting exercises, such as using a "sun dial" to figure out what the shadow of the object we were given, or the box that we created, would look like at a specific time of day in a certain season. The sheets we were given are a great tool, as I will use them in the future to figure out where is the best place to position certain elements within a plan or a model, according to the daylight.

This exercise reminded me of one case study that I thoroughly enjoyed last year in my Architectural History class.: ***the Vitra Campus Conference Pavilion in Weil am Rhein, Germany***, designed by renowned Japanese architect Tadao Ando. Completed in 1993, this minimalist pavilion exemplifies the integration of daylight as a central design element. Ando strategically employs natural light to create a serene and contemplative atmosphere within the space. The pavilion features large expanses of glass and strategically placed skylights, allowing ample daylight to penetrate the interior. The architect pays careful attention to the play of light and shadow, using simple geometric forms and concrete surfaces to enhance the visual experience. The design not only prioritizes the aesthetic qualities of daylight but also addresses its functional aspects, ensuring a well-lit and comfortable environment for various activities. This architectural precedent underscores the significance of daylight not just as an illuminating factor but as a design element that profoundly

influences the spatial qualities and user experience within a building. Daylight holds profound significance in Japanese architecture, reflecting a cultural and aesthetic appreciation for the interplay between nature and the built environment. In traditional Japanese architecture, light is not merely a functional element but a design principle that seeks harmony with the surrounding landscape. Modern Japanese architects, such as Tadao Ando , continue to emphasize the importance of daylight in their designs, employing innovative strategies to maximize natural light while maintaining a sense of balance and tranquillity.

While specific practices may vary, a general approach is to have the main living spaces face south, taking advantage of the path of the sun. This orientation takes advantage of the sun's path in the northern hemisphere, where Japan is located. On the other hand, east-facing windows capture the morning sun, offering a gentle and invigorating light, while west-facing windows receive afternoon sunlight, which can be warmer and more intense. North-facing windows generally receive indirect and softer light, making them suitable for spaces where consistent brightness is desired without the direct glare of the sun.

Thus, the lighting exercise that we did in class is incredibly applicable in real life and it will be a step I will incorporate in all my future models.

Sources: Fig1- Vitra Pavilion- www.vitra.com

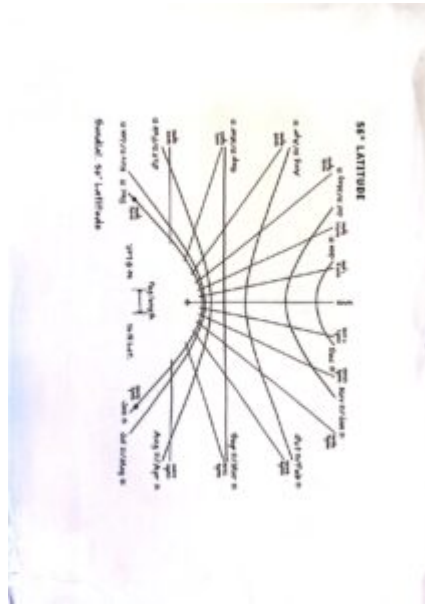
Photos taken during class- taken by me (Daria)

Nussaume, Yann. (2009) *Tadao Ando / Yann Nussaume*. Basel: Birkhäuser.

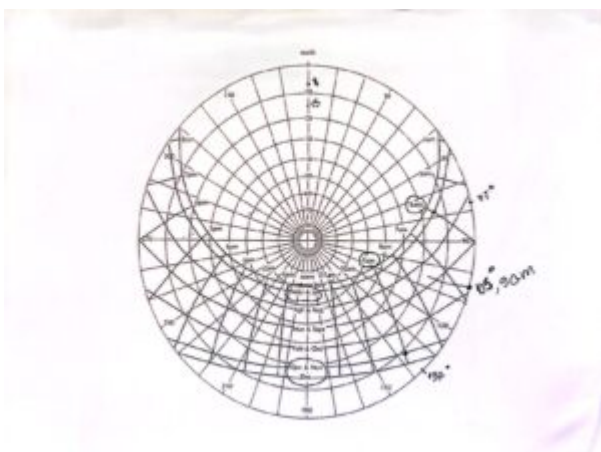
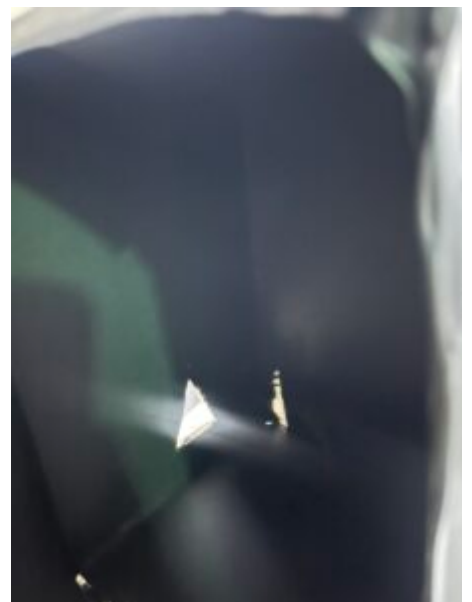
Patfield, E. W. C. (2017) *Kintsukuroi : natural lighting, tectonics and materiality*.

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[.IMG_2057 \(short video\).](#)



Light Analysis at the Chaplaincy

Last Friday, we went on a site visit to the St Albert Chaplaincy . The space is a beautiful architectural piece which combines simplicity with spirituality. The lack of ornaments does not take away from how special the place feels. Upon our visit, we drew different sketches of areas that stood out in terms of light distribution, we measured the light factor in the most lit areas and the darkest ones and we observed the various ways in which both natural and artificial light can be used.

Upon my visit at Westminster Abbey a few weeks ago, I completed a list of different factors that resulted in a successful church lighting project. Stoane Lighting was in charge of the project and we were lucky enough to visit their offices outside Edinburgh. Therefore, I will examine the quintessential factors that must be considered when it comes to using lights in a grand space.

- **LOCATION:**

- Placing lights over the seating area is important to allow members to read along easily. In order to provide an even distribution of light, they need to be spaced out evenly and in relation to windows or other existing natural lighting elements.

- **THE ARCHITECTURE OF THE SPACE:**

- Good architectural lighting design will show off the structure itself to give it a decorative look, while providing plenty of indirect light, outlining the skeleton, overall structure of the building.

- **ACCENT LIGHTING FOR CERTAIN KEY AREAS:**

- Altar, Dome, Choir Stage, Seats, Main Hall
- Spot lights or Sconce lights are preferred

- **LIGHTING MEASUREMENTS:**

- Temperatures between 3000k and 3300k are warm and comforting while still being bright enough to easily see.
- Cool lights, such as 4000k lights, may also be preferred on stages, as they provide a more flattering skin tone.

Analysing the chandeliers designed by Stoane Lighting for Westminster Abbey:

"Working closely with Speirs Major, the task was to refurbish the lighting within the 3m high Waterford Crystal chandeliers, that were donated in 1965 by the Guinness family to mark the 900th anniversary of the founding of the Abbey. Each chandelier comprises around 500 individual parts with glass pieces and drops shaped by hand. At the time they each hosted 56 LED retrofit lamps that were deemed to be well below par."

How was it made?- 56 LED modules were produced for each of the sixteen chandeliers with a silicone optic offering a ~340° omnidirectional decorative beam. . The colour temperature ranges from 1650K – 8000K and is controlled wirelessly using DMX that can adjust the module intensity, colour, saturation and hue. The tiers are controlled separately so that both the colour and brightness of each tier within a pendant is tuneable.

Sources: Fig1,2,3- Westminster Chandelier and LED module-
www.stoanelighting.com.uk

www.stoanelighting.com

King, Laurence. (1972) *Lighting and wiring of churches : recommendations and conditions* / [prepared by Laurence King ...

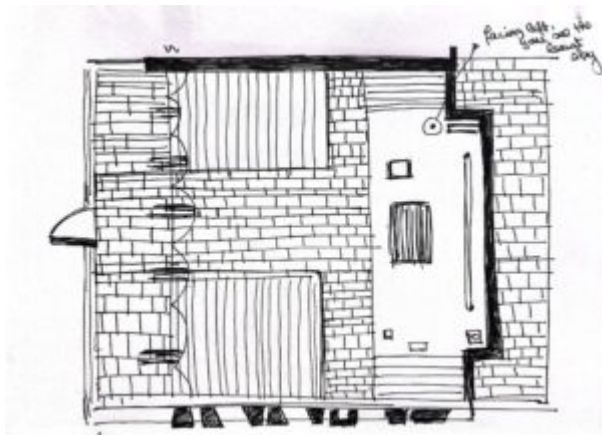
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Site Visit Sketches and Photos- taken by me (Daria)





Daylight factor:

3 locations
 outdoor daylight illuminance: ~~2000-3000~~
 8000 lux

- ① under the slab: 500
- ② by the plane - 50
- ③ by the window - ~~2000-3000~~ 1000-2000
- ④ by the altar: 300

$$① DF = \frac{500}{8000} \times \frac{100}{100} = 0,0625$$

$$② \frac{50}{8000} \times \frac{100}{100} = 0,0125$$

$$③ \frac{2000}{8000} \times \frac{100}{100} =$$







National Museum of Scotland visit

Two Fridays ago, we went on a site visit to the National Museum of Scotland. There, we measured

the daylight factor in different areas of the museum, we drew sketches of interiors that showcased a great relationship with light and overall we understood how important light or the absence of light is. How it can make or break a space. I find the basement area and the groundfloor to be of a very satisfying contrast, in the sense that both interiors are quite similar in terms of arches and columns, yet they convey a completely different feel and atmosphere because of the light. The use of light in museums is crucial for various reasons, including the illumination of exhibits, creating ambiance, enhancing visibility, and contributing to the overall visitor experience. The National Museum of Scotland, in my opinion, is a prime example of light used to its full potential. The architecture and the overall structure of the main hall of the building remind me of Joseph Paxton's Crystal Palace, where the use of modular architecture and the combination of iron cast steel and glass allow for the space to be bathed in a cascade of natural light.

The use of light in museums is an art of its own, designed to enhance the visitor experience while preserving the integrity of precious artefacts. Illumination serves multiple purposes, from showcasing exhibits and emphasizing architectural features to creating a specific ambiance within each space. Museums leverage both natural and

artificial light, strategically balancing brightness and color temperature to optimize visibility without compromising the conservation of delicate objects. Energy-efficient solutions, such as LED lighting, are commonly employed to reduce environmental impact and operational costs. Lighting designers work hand-in-hand with curators to craft various scenes, adjusting levels to draw attention to focal points or immerse visitors in interactive displays.

When it comes to museum lighting, the most common types of luminaires are fluorescent lights, incandescent lights, halogen lamps, and most importantly, LED lights.

They are by far, the most efficient luminaire, as they are cost efficient, have a longer life span than fluorescent lights for example and they present various advantages over traditional lighting methods.

LED lamps offer accurate color rendering, energy efficiency, and preservation benefits, enhancing the visitor experience while minimizing damage to valuable artwork. Glare, which is the downside of most light fixtures, can be easily taken care of through the use of directional lightings, such as LED spotlights and track lighting, which can be used to focus the light precisely where needed, thus reducing the risk of glare.

To conclude, museum and exhibition lighting is a quite intricate domain, as there is a vast criteria that needs to be taken into consideration, before deciding on the type of luminaire.

Characteristics	LEDs	Incandescent Bulbs	HIDs	Fluorescent Lights
Energy Efficiency	High	Low	Moderate to High	Moderate to High
UV Rays Emission	Negligible	Negligible	Low	Low
Color Rendering Index	Excellent (CRI 80+)	Low	Varies	Good (CRI 80+)
Lifespan	Long (More than 50,000 hrs)	Short (Approx. 1,000 hrs)	Moderate (Approx. 10,000 hrs)	Moderate (Approx. 10,000 hrs)
Heat Emission	Low	High	High	Moderate
Instant On/Off	Yes	Yes	No	Yes
Environmental Impact	Low	High	Moderate	Moderate

Sources: Anon (2015) *Lighting for museums and art galleries*. London: Society of Light and Lighting.

Turner, Janet. (1998) *Designing with light : public places : lighting solutions for exhibitions, museums and historic spaces / Janet Turner*. Cèligny: RotoVision.

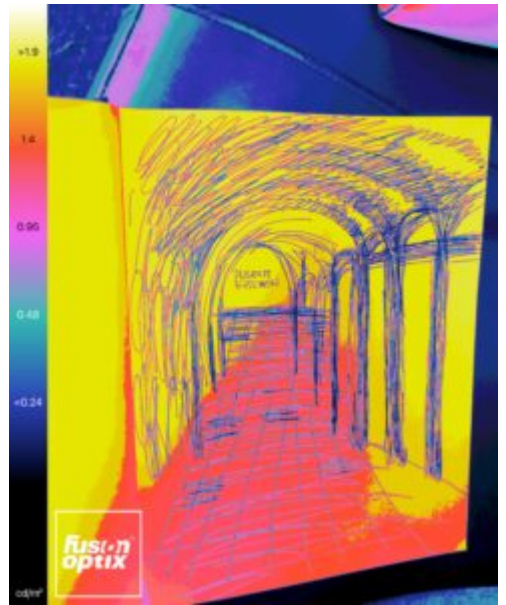
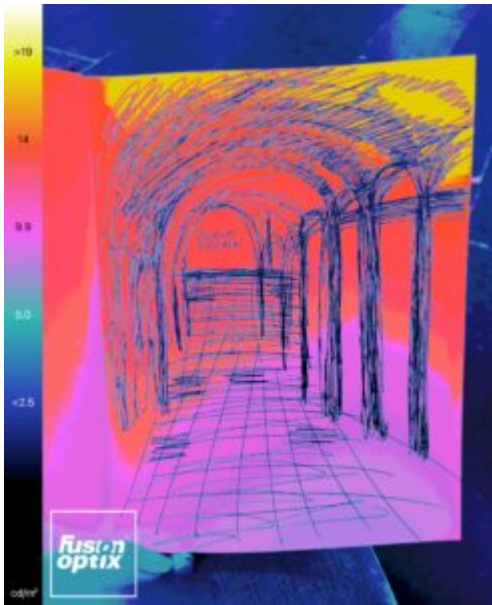
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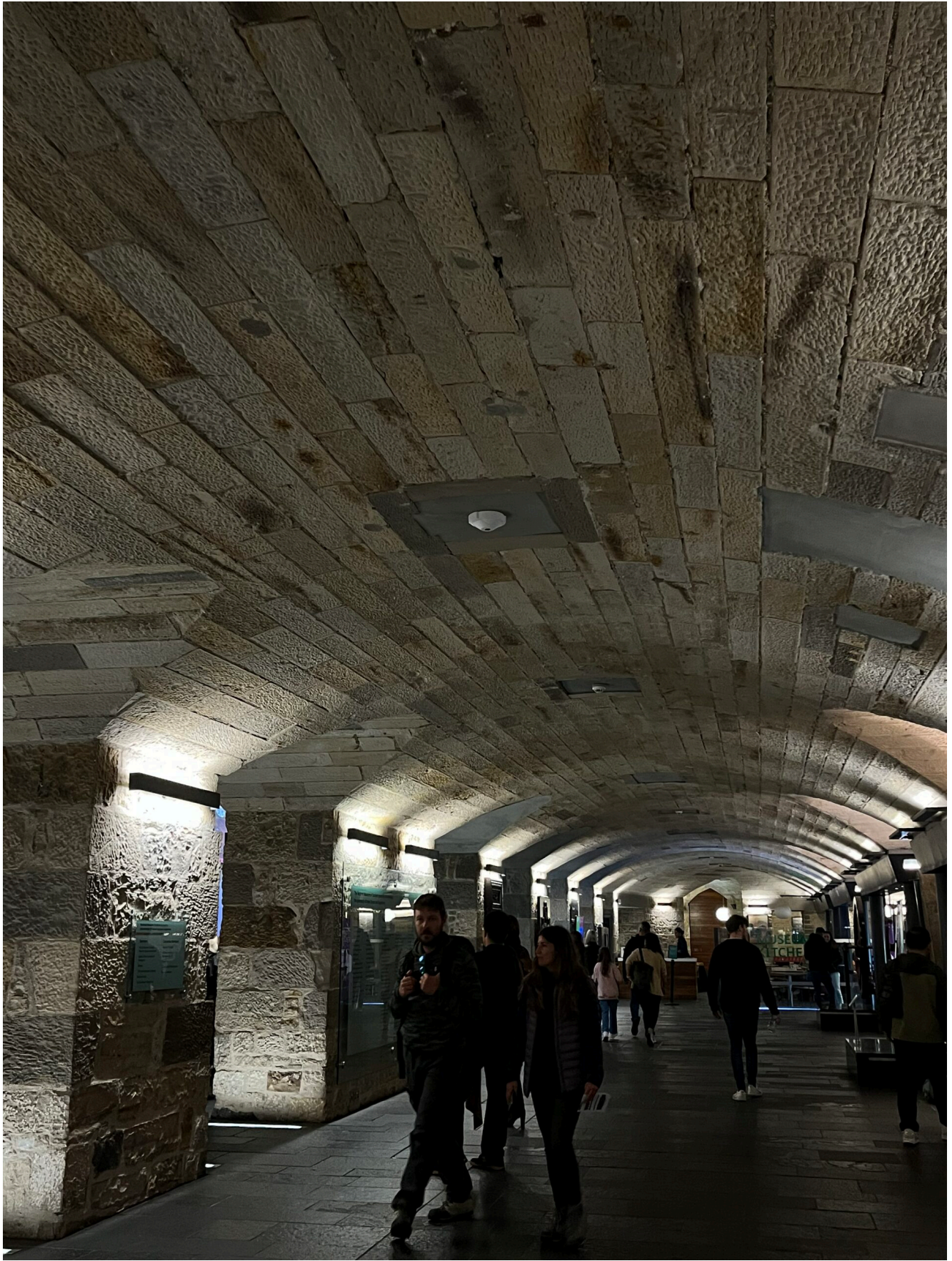
museums: Ageing effects on terpenoid resins assessed through Raman spectroscopy and chemometrics. *Strain*. [Online] 54 (3), .

Fig1: Comparison with Traditional Lighting Options

Museum Photos- take by me (Daria)- arched interiors, play between light and dark.







Light Experiment in Svalbard

Most of us, as humans inhabiting the world, are lucky enough to get to experience natural light everyday. However, that is not the case for people living in certain areas in the Northern Hemisphere, especially in the Arctic Circle. The lack of daylight can lead to depression and health issues, as Vitamin D is vital for the production of serotonin. Thus, there is a dire need for a long-term solution, may it be artificial.

Philips, the renowned electronics company, came up with a terrific initiative for people living in the Northern Hemisphere. In order to fight off sleep inertia, Philips gave thousands of lamps to the **people of Svalbard**. The artificial light from the lamp would help them wake up in a healthier not so sudden way, as they would feel the light on them, almost like the sun light, before fully waking up. This experiment increased people's moods and took away the morning grogginess. Such experiments evoke just how significant light is in our every day life. As an interior designer, **people's comfort comes to mind first**, thus this experiment shed light on an extremely important matter that I perhaps did not pay that much attention to before: lighting can make or break a space. I have seen so many spaces with huge potential ruined by the misuse of light, or not so well taken care of spaces where the right amount and colour of light changed the space entirely. Light has a direct relation with our mood, therefore, if I want people to want to spend time in an interior I design, I have to figure out a way to use light efficiently. *Dim light can either create a relaxing, cozy atmosphere for example, whereas a bright, neon light works well for supermarkets where people need to stay active and alert.*

So what makes it such an ingenious product? – First of all It combines advanced ‘sun rising simulation’ light technology with new, personalised sound options, it provides an easy-to-use navigation panel on the front of the product. There is also a USB port for uploading various sounds or music, thus, one can tailor the wake up ritual to their own preference. This experiment makes it evident how essential light, whether it is natural or artificial, is for all aspects of our life. This product showcases features such as the sunrise simulating process which is adjustable from 20 to 40 minutes, 20 brightness settings, coloured sunrise simulation that goes from red, to orange to yellow and light intensity of 300 Lux. To conclude, I find it that such a complex product should serve as an example for innovation to other lighting firms, and should hopefully, at one point in the foreseeable future, become a staple.

Sources: fig1: Philips Wake up Light – www.philips.co.uk

fig2: View of Svalbard at night- www.vogue.com

Sources: Zaki, S. (2023) *Innovation in lighting & Philips' strategy* Shahid Zaki.

Temp, A. et al. (2017) *Well-being at the Polish Polar Station, Svalbard:Adaptation to extreme environments.*



Wake up naturally
with **sunrise simulation**



Lighting Exercise

*During class we were each given a photo of a space where light had a dramatic effect and created a contrast with the interior. Mine was a very minimalist cathedral, where a gigantic cross stood tall as the epicentre of the interior. I found the way the fractions of light were being cast through the openings created by the cross quite astonishing. Using a "Thermal" app, we were able to see **the dramatic difference various types of light can create**. It reminded me of Le Corbusier's chapel, Notre Dame du Haut, where light is undoubtedly the epicentre. Small squares cut out from the concrete walls create a surreal atmosphere and accentuate the somberness of the space. Upon analysing and doing research about the building, I have come up with a list of characteristics regarding the lighting that truly stood out to me.*

Natural Light Integration: Le Corbusier placed significant emphasis on the integration of natural light into the Notre Dame du Haut. The chapel features strategically placed openings, including small windows, large glazed areas, and an oculus in the roof. These elements allow natural light to enter the interior in varying ways throughout the day.

The Oculus : This large opening, allows sunlight to filter into the space, creating dynamic patterns of light and shadow. This intentional use of natural light enhances the spiritual experience within the chapel and it creates a sacred feel, working hand in and with the purpose of the building, as light becomes a metaphor for the divine. Thus, the space created transcends the purely functional, traditional aspects of architecture.

Artificial Lighting Considerations: While natural light is a dominant feature, artificial lighting is also carefully considered. Le Corbusier designed specific fixtures to complement the natural lighting and provide illumination when needed, ensuring that the chapel remains functional and welcoming during evening services or darker periods.

Material Selection: The choice of materials in the construction of Notre Dame du Haut also contributes to the play of light. The use of rough stone and other materials such as textured concrete interacts with light in a way that adds texture and depth to the interior.

It is safe to say, that Le Corbusier's Notre Dame du Haut is a remarkable example of the way light can be used as a fundamental element in the design of a religious space. The intentional integration of natural and artificial light and the consideration of the dynamic qualities of light and shadow all contribute to providing an immersive and sensorial experience for this visiting. The same effect is obtained in the example I received, through the massive cross opening.

Moreover, I generated an AI interior of a cathedral, meant to convey the same feeling as Notre Dame du Haut, through the intelligent and effective use of light.



Sources:

fig1: thermal qualities of the space I examined.- photo taken by me (Daria)

fig2- Notre Dame du Haut- www.fondationlecorbusier.fr

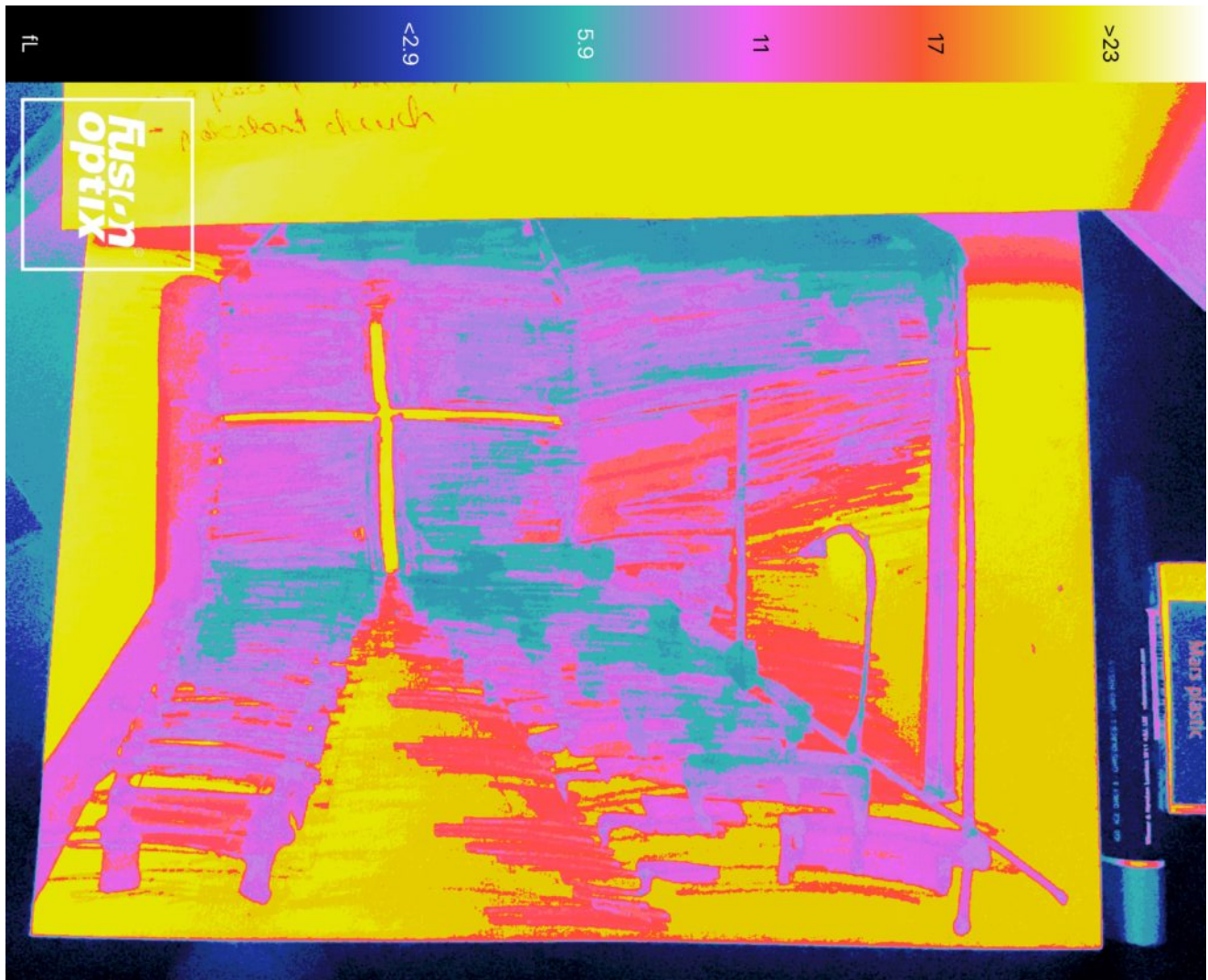
fig3- AI generated cathedral interior

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Impressive lighting

This summer I went to a temporary art exhibition in my home city, Bucharest. The building itself, an old palace in the old town, is an architectural jewel, with intricate details and a myriad of materials. It was my first time going inside and I was left in awe. The main room, the dome, is covered in a veil of darkness and mystery, with just a few rays of light coming from the

small bulls' eye windows. I find the play between *light and darkness* almost surreal and dream like. Light is a quintessential tool for any interior, as it successfully draws attention to certain key elements.

Upon my work in preparation to becoming an interior designer/architect, I have discovered a myriad of ways in which light can dramatically make a difference. *For instance*, adequate lighting is essential for visibility and functionality in any space. Proper illumination allows people to perform tasks comfortably and safely, whether it's reading, cooking, working, or any other activity. *Secondly*, light has a significant impact on the visual appeal of a space. The way light interacts with colors, textures, and shapes can enhance or diminish the overall aesthetic of a room. Thoughtfully designed lighting can highlight architectural features, artwork, or specific design elements, contributing to the overall ambiance. *Thirdly*, lighting can influence the mood and atmosphere of a room. Different types of lighting, such as warm or cool tones, can create varying emotional responses. For example, warm lighting may evoke a cozy and intimate atmosphere, while cool lighting can create a more lively and energetic feel. *Furthermore*, light also affects how we perceive the size and shape of a room. Well-planned lighting can visually expand or contract spaces, making them feel larger, cozier, or more open based on the design goals. *Lastly*, natural light, in particular, has been linked to improved well-being and productivity. Incorporating natural light into interior design can positively impact occupants by regulating circadian rhythms, improving mood, and reducing eyestrain.

Whilst it is clear that lighting is vital for the spaces we inhabit, it is important to highlight that most luminaires and light fixtures are energy consuming and not eco-friendly. Thus, the world of interior design and lighting has been

recently opting for alternatives, such as LED lights, which consume less energy, or, many firms have come up with innovative luminaires. The brand Flos, is a great example of being able to focus on both aesthetics and sustainability at the same time. For example, their Super Line Pro luminaire, a suspended bar for working spaces, has been provided with a remote driver that can be easily replaced or upgraded to a dimmable system. Thus, they take the environment into consideration with every product they design.

Sources: fig1- www.iop.org- difference between LED and traditional light bulbs in terms of Watts

fig2: photo taken by Daria (me), September 2023

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**Traditional
filament**



100 W

**Compact
fluorescent**



20 W

LED



10 W



