Saudi Arabia, Al Ula: campfires at an ancient site (AI generated image)

Illuminating the Past, Envisioning the Future

Faraz Izhar explores the evolution and impact of generative AI on heritage lighting design

From the flickering embers of ancient campfires to the marvels that dot our modern skylines, lighting has evolved reflecting technological advancements and societal values, cultural shifts and artistic expressions. Today with the boundless potential of generative artificial intelligence, how can we illuminate our future, honouring the relics of our past while embracing the innovations of tomorrow? In this article, this nexus of tradition and technology will be explored to envision a future where every beam of light tells a tale as old as time yet as fresh as a new dawn.

Traversing the ages of light

The evolutional narrative of architectural lighting design is as diverse as it is rich. Each era has contributed a chapter in this ongoing story; from the use of natural light and fire pits in ancient times to today's complex media façades, light has been an intrinsic part of human expression and architectural magnificence. In ancient Egypt, windows and corridors were strategically placed in temples to make the most of sunlight for spiritual significance. The Romans introduced glass windows using light to enhance indoor spaces. During the Medieval period, candles and torches were used to symbolise the divine in religious architecture. In Gothic cathedrals stained glass and candles were deployed to create an ethereal connection to the divine, showcasing the power of light to influence emotion and spirituality.

The Renaissance period had a renewed focus on natural light and its effects on aesthetics and architecture. The manipulation of light and shadow became a central aspect of architectural design, emphasising dimensions, depth and the positive impact of lighting on the human experience within a space. The Industrial Revolution meant the use of gas lighting as a public utility, illuminating streets, public buildings and areas at night. This significantly influenced urban development, extending productive hours and enhancing public safety. By the 1920s and 1930s, electric lighting had become mainstream in developed countries and was eventually widely adopted around the globe.

The contemporary canvas

The role of a lighting designer has undergone significant changes in recent times. With LED technology and

Using AI and digital mapping to reconstruct lost historic assets through holograms (AI generated image)

UK: the use of stained glass in a cathedral setting (AI generated image)

miniaturized light sources, designers now have a vast array of creative lighting solutions at their disposal. These solutions can respect the historical integrity of sites while meeting modern lighting standards. In addition, an increased emphasis on sustainability and circularity has resulted in the adoption of sustainable light sources and renewable components in lighting design and manufacturing.

The emergence of intelligent lighting controls and technologies has introduced dynamic and flexible lighting systems that can adjust in real time according to several parameters. These parameters include natural light conditions, occupancy, specific events and more. As a result, designers can create personalised experiences that enhance the storytelling aspect of heritage sites, while also highlighting technical innovations in the field.

The era of generative AI

The introduction of generative AI into this mix marks a pivotal moment. This technology can analyse vast datasets and generate creative solutions offering unprecedented opportunities for innovation. Text-to-image generative AI platforms represent a significant advancement in conceptual design workflows. Unlike traditional computer aided design (CAD) tools, generative AI can create or generate new visuals based on parameters or inputs provided by human designers. Using platforms like Midjourney, designers can input descriptive text and images as raw data and set specific output goals. The AI then processes this data to generate a wide range of options, each reflecting the input criteria but with variations that a human designer might not have considered. This process allows for the rapid exploration of concepts, pushing the boundaries of creativity and innovation.

Generative AI can use historical context and narrative inputs, architectural details and a desired emotional impact in heritage lighting to generate lighting concepts. This process allows designers to explore multiple possibilities, combining traditional aesthetics with modern lighting techniques to create unique and meaningful experiences. Designers can describe their vision in words – a mood, a story, an ambience – and see it translated into visual concepts. This capability streamlines the design process and enables a more intuitive exploration of ideas, making the design more accessible and inclusive.

Applications and implications

The implications of generative AI in heritage lighting are significant. For example when working on a heritage site, designers can use a generative AI programme's datasets to produce images based on the context of that historical period, mimicking the exact way that these buildings were illuminated originally. Designers can then use these simulations to recreate the design with modern lighting and control technology while adhering to conservation principles. This approach enhances the aesthetic and emotional impact of sites and contributes to historic preservation by ensuring that lighting does not damage sensitive materials.

The restoration and reconstruction of Notre Dame de Paris with the help of digital depiction provides a compelling example of the potential of data sets. These data sets enable the planning of restoration works faithful to the original design. Similarly, lighting designers can use existing data to simulate various lighting scenarios, respecting a site's history, improving upon them with new technology to create an immersive experience, and showcasing the beauty of sites in a new light.

Ethical and creative considerations

The integration of generative AI into heritage lighting is not just an evolution in technology, but a leap towards a more

The use of drones in mapping data nodes (AI generated image)

profound understanding and appreciation of the past. As we embrace its possibilities, we must also navigate the ethical considerations it brings. The importance of respecting historical integrity and cultural significance in heritage projects cannot be overstated. Generative AI, for all its innovation, must be guided by human sensitivity and understanding to ensure that the resulting designs enhance rather than detract from the heritage.

As with the rise of any new technology, this future comes with its challenges. Issues such as data privacy, intellectual property and the potential for the homogenisation of design require careful consideration. The accessibility of generative AI tools and the skills to use them effectively present barriers that the industry must overcome through education and training. Establishing guidelines which prioritise respect for historical accuracy and cultural significance is also crucial. This includes being mindful of the data sources used to train AI systems, ensuring that they are representative and free from biases which could distort the design outcomes.

However, these challenges also present opportunities for collaboration, dialogue and innovation. Designers, urban planners, historians, AI trainers, technologists and conservators need to work together to harness the power of generative AI not just for lighting, but all other disciplines to produce respectful, sustainable and transformative results. This collaborative synergy will be pivotal in realising the full potential of technology. Such partnerships can lead to the development of generative AI systems that are not only technically proficient, but also profoundly attuned to the nuances of history, culture and architectural integrity. Through these collaborations, we can create lighting designs that are informed by a deep understanding of each site's unique story, ensuring that the technology highlights rather than overshadows the historical narrative.

Navigating the future

The future lies in a collaborative approach between human designers and AI. Generative AI is meant to be used in a co-pilot mode, providing a tool for designers to expand the creative possibilities and explore a wider range of options and solutions. However, the human element remains irreplaceable, as designers must have an understanding of a site's historical, cultural and emotional context to create effective lighting solutions. To make the best use of data sets, designers must guide the AI by inputting not just technical parameters, but also the stories and significance of the sites to be illuminated. When used by skilled designers, this technology becomes a powerful ally in marrying the historical and the contemporary, telling stories through light in respectful, evocative and breathtakingly beautiful ways.

Furthermore, generative AI in lighting has practical applications beyond aesthetics. It offers solutions to sustainability and circularity challenges such as energy efficiency, conservation and adaptive reuse, ensuring that these treasures are preserved for future generations while minimising environmental impact.

Conclusion

The evolution of lighting design reflects humanity's quest to harness light. Embarking on the next chapter of this journey with generative AI, we are on the brink of a new design era. This technology promises to revolutionise the way we think about and execute lighting design. It offers the tools to illuminate the past and reimagine how to preserve and present it for future generations. This technology empowers designers to weave intricate tales of light that resonate with historical sites, enhancing their beauty and bringing stories to life in vivid detail. The potential for creating immersive, dynamic experiences that engage visitors emotionally and intellectually opens up new possibilities for interpretation and interaction with cultural heritage. As this unfolds, we can expect to see further innovation, creativity and collaboration. ●

Faraz Izhar, lead Lighting Designer, AE7, Dubai

Eqypt: fires lighting an ancient temple (AI generated image)