THE MAGAZINE OF THE ILLUMINATING ENGINEERING SOCIETY

LD+A

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LD+A
JUNE 2025 • VOLUME 55 • NO. 6

FIRST UP

PLUS

Photo: Gareth Gardner

FEATURES

On The Cover
A repurposed space celebrates past and present Taiwanese culture.
Photos: Sen-Yung Liu and iStockphoto

EDITOR'S NOTE

Local Color

In this month's "Museums and Exhibits" theme issue, Amy Nelson from the Metropolitan Museum of Art discusses illumination as a form of storytelling. An optimal museum environment is one where artifacts and stories can be viewed in a design context where aesthetics, function, and conservation are observed.

Here in *LD+A*, not unlike most of the other lighting and architecture publications on the market, we often highlight large-scale, eye-popping, and splashy work. While impressive, improved illumination is also needed well beyond 800-pound-gorilla-type projects. There's a reason why The Met, The Getty, and The Smithsonian museums leave lasting impressions on tens of millions of visitors each year, but there are also scores of smaller, local historical venues right in our own backyards.

Within a 25-mile radius of my house, I have explored Insectropolis, "The Bugseum of New Jersey"; the Seaside Heights Carousel Pavilion and Museum; and Tuckerton Seaport and Baymen's Museum, and that's not including various towns' historical societies. These local organizations are generally challenged by tighter budgets while relying on diverse lighting needs—both natural and artificial.

Photo: Tuckerton Seaport

Natural light paints a picture of Tuckerton Seaport.

Photo: Craig Causer

The 115-year-old Floyd Moreland Carousel is the centerpiece of the Seaside Heights pavilion and museum.

Preserving history goes well beyond the role of museum curators. Lighting designers have the unique skills to help groups create enhanced experiences to communicate local color. Art critic Jerry Saltz said that museums are "wormholes to other worlds." As the lighting industry continues to innovate and evolve, designers can look to the world right outside their front doors to offer their expertise. Will the worm turn on these gems that communicate what makes our hometowns unique, or are we to continue to confine local history and aging community museums to elementary school field trips?

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landscapeforms

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READERS WRITE

Is More Light Safer?

IS MORE LIGHT SAFER?

Addressing the question that ruins conversations

By Jane Slade

Since I began advocating for natural darkness, there is one question that has been an incredible obstacle to awareness-creation, like a record scratching to a halt. This one question thwarts our collective thought process and subsequent understanding by immediately creating a lens of fear: *Is more light safer?*

As we struggle to create understanding of light pollution, climate change is becoming more extreme. This year, the world recorded the warmest January ever. Simultaneously, the U.S. recorded the coldest January since 1988. This radicalization of temperatures on Earth is a symptom of global warming and the melting of ancient ice caps: more water, more weather.

Not only are global temperatures breaking records, it has also never been brighter on the planet. We are currently experiencing a 9.6% year-over-year increase in sky brightness.[1] As humans have become comfortable with light and light-driven information at all hours of night, we have pushed darkness to the edges of existence, both for ourselves and wildlife.

In our own self-poisoning, we have lost sight of experiences in darkness altogether. Most of us no longer create memories underneath the night sky, which is now doubling in brightness every eight years.[1] One could perhaps think of the data bits of light-driven information as having the same impact that water has on weather: more light-driven information, more light pollution. If we cannot remember it, we can neither protect it nor cultivate it. Therefore, it is imperative that we combat our amnesia by cultivating awareness in the collective understanding of light pollution and how to solve it.

Yet there is a very specific stumbling block in our discourse around light pollution that has created chronic confusion and disagreement about best lighting practices. In my experience in project meetings with the public, planning boards, and municipalities, the question "Is more light safer?" has been a continual driver of light pollution and lower-quality lighting installations in the zeitgeist.

When posed to a diurnal species with an innate propensity to feel safety and comfort in lit environments, the question is leading. More often than necessary, it funnels out a "yes." In addition, this nearly omnipresent question has disproportionately framed our conversations around light at night, often rerouting our thought process to unhelpful places.

The question then begs us to ask, safe from what? Immediately, we are set out on a line of inquiry based in fear, and much less to do with lighting. The mind is provoked to populate potential threats of danger, so it becomes easy to suggest adding light as a harmless solution, as framed by the question itself. Studies show that when stressors are introduced, subjects are unable to think as clearly or creatively and generally fall back on habit and intuition.[2]

A Betrayal of Intuition

This is an issue because best lighting practices are often counter-intuitive. Right now, many lighting projects default to adding more light simply because it feels safer to do so. Yet a dive into the research reveals no such simple conclusion.

Studies often show reasons why more light is not safer.

For instance, a 2015 study on street lighting in England and Wales showed that a reduction in light levels held little correlation to increases in crime or traffic accidents.[3] Furthermore, a study in Chicago revealed that when city lights went out, crime shifted to where the lights remained on.[4] Both of these examples show how our intuition has often misguided our understanding of the role of light upon safety.

Our intuition has also betrayed us to believe that light at night is innocuous. Sadly, it is not yet common knowledge that exposure to artificial light at night is abjectly not safe for many other living things. One of the most glaring omissions in the thought process created by the question "Is more light safer?" is the heartbreaking impacts upon wildlife. From impeding nocturnal pollination to contributing to the decline of a staggering 49% of bird species on the planet,[5] the lack of consideration for wildlife in our thought process is evident.

Yet light pollution is harmful for humans, too. Recent studies have shown that exposure is not only linked to cancer but also neurodegeneration and diseases like Alzheimer's.[6] When we overuse safety as a lens for lighting design strategies, we also dupe ourselves out of our own well-being. Therefore, perhaps it is the question itself that is confusing us.

More light does not always mean more visibility. This question eclipses our understanding of dark adaptation of the eye. More light than necessary interrupts this process, which can take up to an hour. Moreover, the lighting designer has many tools and strategies to create nighttime environments that build harmony with both ourselves and the natural world, even some we have not thought of yet. By constantly over-lighting, we prevent innovation in design to find better strategies that work with the eye's ability to see in lower light levels.

Currently taking place on Earth are large swaths of empty parking lots being illuminated night after night for few to zero occupants. Satellite data revealed that continuously lit spaces across the surface of Earth increased in brightness by 2.2% per year between 2012 and 2016.[7] Yet modern controls systems can easily create lighting plans with intricate dimming schedules down to a single fixture. What keeps these spaces illuminated unnecessarily, causing untold harm to ecosystems, is not an obstacle with technology. It is the thinking behind it.

Destroying the Question

Susan Sontag once said, "The only interesting answers are those which destroy the questions." If our own research reveals that adding light just to increase safety is often harmful and costly with little to no benefit for humans, then why are we letting this question inform our decisions so consistently? We could be designing spaces with much less light in terms of both intensity and duration, while creating feelings of safety and gaining back periods of essential ecological darkness. Therefore, we must ask ourselves better questions to get better results.

The question "Is more light safer?" is an obstacle to higher-quality discourse. It oversimplifies the art and science of lighting into a yes or no question and narrows the mind around answers based in fear. Its flawed trajectory repeatedly gaslights us to make ill-informed and hasty design decisions. This question arrests the progression of thought and becomes a direct barrier to the wealth of knowledge currently available on how to light more sustainably for all living things. Overall, it creates confusion around best lighting practices and generates light pollution.

As designers, the quality of our methods and tools impacts the design. If some of our tools are questions themselves, we must design the questions we work with to create the quality of discourse we need, faceted enough to hold what we already know to be true, and open enough to invite in new knowledge.

Therefore, I propose that the dangerously oversimplified question "Is more light safer?" be distilled out of our discourse in the lighting industry. When we hear this question being asked, let us actively design the discourse, redirect the question, call out how it has typically created less quality in design, and elevate the conversation with other, more open-ended and truth-seeking questions, such as:

- Is more light less safe?
- What are the downsides to more light?
- How can light decrease safety?
- How can we increase visibility?
- Is more quality lighting safer?
- What factors improve lighting quality?
- What factors improve visibility?
- Is more darkness safer?
- How can darkness increase safety?
- How can nighttime environments promote well-being?

Light Well, Not More

Balancing personal safety from night lighting against global losses ("Is More Light Safer?" *LD+A*, April 2025) is a classic "Tragedy of the Commons" situation.[1] If someone is asking the question, then the odds are pretty low that their perceptions of the global risks from their individual actions will outweigh their direct risk (crime) from lower lighting levels.

A possibly more persuasive argument against simply adding more lighting is to note that lighting makes it possible for everyone, including criminals, to navigate quickly and safely while evaluating the local environment. More light generally means more activity, which means more chance of accidents and more targets for crime. Adding more light changes the character of an area, and not necessarily for the better. I still recall reading about a school district that solved its graffiti and vandalism problem by turning off schoolyard lights so that it was too dark to be a hangout. Making it easier to see that a potential victim is alone, small, female, young, old, or inebriated is similarly not what you wish to accomplish.

Crime is a social problem. In urban areas where economic and social networks may be inadequate, criminal behavior may become an attractive option or even necessity for some people. In this case, more lighting may make criminal activity easier; perhaps explaining the seeming paradoxical finding that crime shifted to more lit areas in Chicago when lights went out.

Light well, and not just more.

Robert Clear
Member IES

References

1 Garret Hardin, "The Tragedy of the Commons," *Science*, vol. 162, pp. 1243–1248, Dec. 1968.

LD+A reserves the right to edit letters for length and/or clarity.

INSIGHTS

Home Fashion • Tubular • Tea Lights

Photos: Maxime Verret

La Moda in Milano

An minimalist installation celebrates multiple forms of design

French luxury house, Hermès, best known for its handmade leather handbags and luggage, presented its 2025 home collection of colorful furniture, dinnerware, and soft goods at Milan Design Week in April. For the fifth year in a row, the fashion brand paired with design firm L'Observatoire International to create an illuminated installation. This year's presentation, by L'Observatoire International Director Hervé Descottes and Hermès Home Division Directors Alexis Fabry and Charlotte Macaux Perelman, focused on themes of lightness, color, and reflection. With white geometric frames and translucent technicolor elements, the lighting scheme allows for pools of glowing color to form beneath the suspended structures and highlight new home goods.

Photo: Maryn Devine

Lines of Communication

From December 2024 through the end of March 2025, *Spaghetti Chorus*, by design studio Daily tous les jours, was on view in the atrium of the National Gallery in Ottawa, Canada. The 140 continuous meters (~460 ft) of luminous "noodles" acted as a messaging system: as guests spoke into one of the two microphones placed below the installation, LED tubes slowly shifted in color and guests' voices transformed into melodic sounds. The interactive artwork is part of the design firm's "Hello" series that explores human connection and will be on view again in the same location for the 2025 winter months.

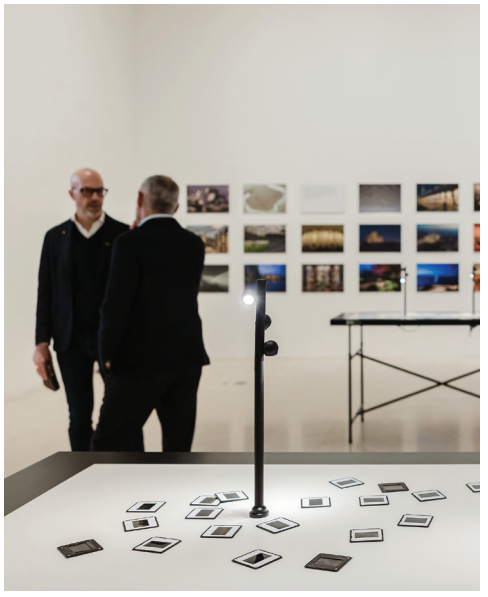


Photo: Marcela Schneider Ferreira

Box of Light

The ERCO Light Factory presented "ERCO Light Box" at Fuorisalone 2025, a special exhibit at the Triennale Museum in Milan, Italy, in April. The installation featured selected images from 40 years of curated ERCO photography in a minimalist, luminous space and was a play on the backlit table as a working tool for selecting slides for advertisements and images in print media. The photographs, and their presentation, offered unique perspectives on the creative process and light as part of immersive experiences and architectural design.

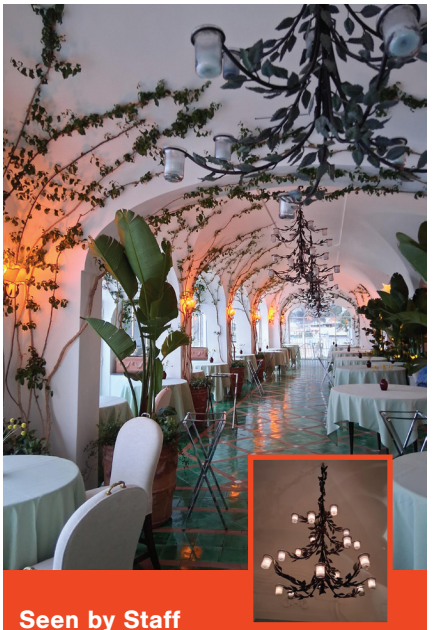
THEY SAID IT:

"Museum illumination typically employs three key layers from above or within, including ambient, accent, and task lighting"

Amy Nelson, "Momentous and Momentary," p.40

MERGERS & MORE:

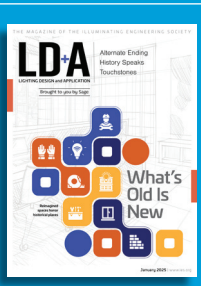
- **Leviton** completed a $25 million expansion of its Fuquay-Varina, NC, fiber optic manufacturing plant.
- Volumes Two and Three of *Collected Light*, a series of books from **Light Collective** and **Women in Lighting**, which highlights the work of women light artists, will soon be available for purchase at *www.womeninlighting.com*. The third book in the series, which takes a special look at women in entertainment lighting, is supported by **Arton Lighting**.
- **Moment Factory**, a multidisciplinary entertainment studio specializing in immersive environments that weave light, sound, and video, has been named one of the "Most Innovative Companies" for the third time by *Fast Company*, a global business media brand.
- **Savant**, a leader in smart home and smart power technology, has announced native cloud integration with **ClimateMaster**'s heat pumps, allowing for "full climate control" within the Savant App.
- **SCHONBEK** and **Modern Forms** opened a 10,000-sq-ft showroom inside the International Home Furnishings Center in High Point, NC.



Photos: Michele Zimmerman

Seen by Staff

Multiple vine-like, metal chandeliers inside the dining room at Le Sirenuse Hotel in Positano, Italy, each hold 18 real candles. It takes the hotel staff approximately 4 hours to light the chandeliers before each dinner service.



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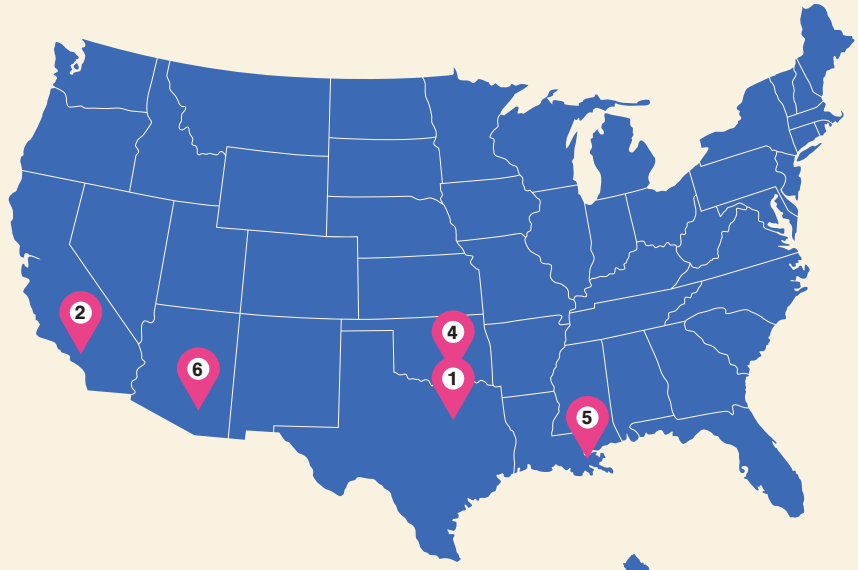
LIGHTING DESIGN and APPLICATION

Share Your Voice

If you are interested in publishing an article in *LD+A*, please reach out to Editor-in-Chief Craig Causer at **Craig.Causer@sagepub.com** to discuss further.

EVENTS



1. June 18–21

Lightovation, the largest residential lighting show in North America, returns to the Dallas Market Center. The event features comprehensive collections of lighting as well as ceiling fans, controls, light sources, and smart and connected lighting systems.
www.dallasmarketcenter.com

2. August 21–23

IES25: The Lighting Conference, IES' annual conference, will be held at the Anaheim Marriott in California. The event includes one day of hands-on workshops and two days of educational sessions, technical paper presentations, and manufacturers' exhibits as well as the Illumination Awards Gala.
www.ies.org

3. September 11

The ICEL Emergency Lighting Conference will be held at the Cavendish Conference Centre in London and is designed to bring together key stakeholders across the complete supply chain in emergency lighting from manufacturer to occupier.
www.lia.org

4. September 16–17

ArchLIGHT Summit, a commercial and architectural lighting event, will be held at the Dallas Market Center in Texas. It will showcase new products from leading commercial brands and include a full slate of accredited educational and hands-on experiential sessions facilitated by leading minds in design and lighting.
www.archlightsummit.com

5. September 21–25

The IES Street and Area Lighting Conference will be held in New Orleans and focus on improving outdoor lighting through training classes, seminars, and networking sessions as well as an exhibit hall.
www.ies.org

6. October 9–11

IALD Enlighten Americas 2025 will be held at The Westin La Paloma in Tuscon, AZ, and will feature educational workshops, seminars, and presentations by nearly 40 industry leaders.
www.iald.org

Q+A

HARRY TRIGGS

TM Lighting Co-Founder Harry Triggs talks about custom design for artistic retail displays such as the opulent Patek Philippe windows in London Town.

How did TM Lighting become involved with the Patek Philippe project, and what was the firm's role?

The team at Patek Philippe was impressed with our work on another luxury storefront in the Mayfair area of London, and we were introduced by the contractor involved in both projects. Our scope constituted the replacement of the existing lights in the brand's display cases to better exhibit their luxury watches.

What was this project's main objective and biggest challenge?

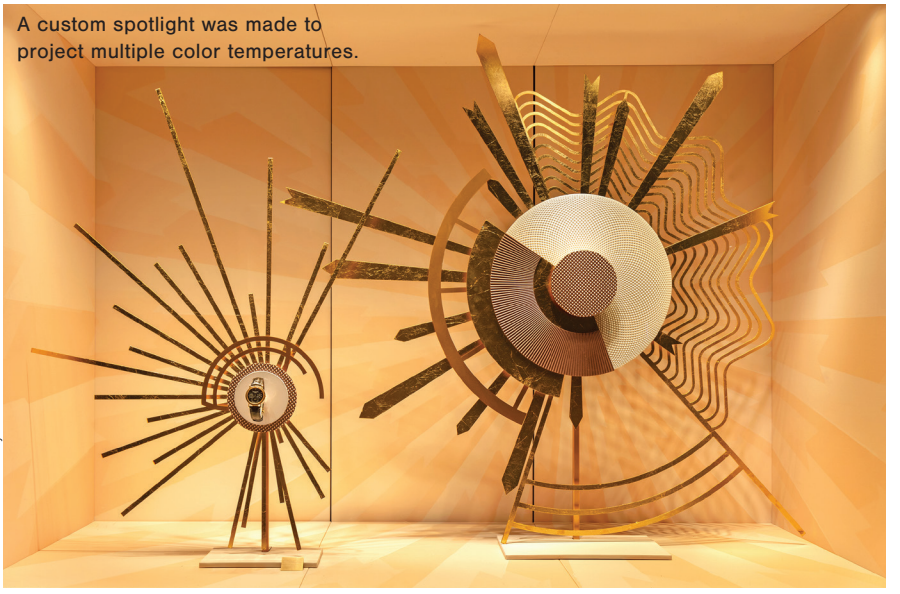
The primary objective of the project was to light Patek Philippe's watches in a considered manner. A warmer light will make gold appear brighter but make a silver watch look dull, so we developed a new product to meet this specification: the 'Twin-Headed' G40 spotlight, which can project varying levels of color temperature, allowing for the flexibility to blend between 3000K and 4000K. By installing multiple lighting point sources, we were also able to create more specularity within the precious stones on display, thereby enhancing their natural sparkle; the SlimLight Pro picture light accentuated this effect by flooding each vitrine with the highest color rendition of light (98+ CRI).

> We were able to consider each timepiece as a work of art and could light each with the precision and quality expected in a gallery

The biggest challenge was installing our products within existing display cases, as they needed to be of a particularly low profile as not to distract from the watches; thus, when developing the G40 spotlight, we designed it in such a way that it could be installed inconspicuously, on a low-voltage lighting track that offered maximum versatility in a very confined space. Another challenge was the time pressure—to minimize disruption to the store, we were tasked with installing our lights across two consecutive nights.

Are there unique considerations when retail design is also artistic in nature?

A necessary consideration when working in a retail space is a balance between appearance and functionality. With Patek Philippe in particular, security is a major factor—we opted to tune all lights in the store using Bluetooth Casambi, so that they could be universally controlled from



A custom spotlight was made to project multiple color temperatures.

Photos: Andrew Beasley

a smartphone app, meaning that the display cases could remain securely closed. Furthermore, window lighting needs to be very bright and directed to counter inevitable daylight, which we achieved through powerful LED lighting, which is also more economical, with the G40 requiring just 4 watts and the SlimLight Pro picture lights requiring 14 watts.

What were the solutions implemented to solve any design hurdles in the Patek Philippe storefront project and how did they differ, or remain the same, from the many museum and art gallery projects in the TM Lighting portfolio?

Unlike many stores where watches and jewelry are displayed in groups, the products at this store are habitually displayed independently of each other so as not to distract from their craftsmanship. We were able to consider each timepiece as a work of art and could light each with the precision and quality expected in a gallery, drawing on our experience lighting masterpieces at The Wallace Collection, the National Trust, and Frieze London. A Patek Philippe watch is a sculpture-of-sorts, but one that requires a specific approach to lighting—whereas a large-scale work by Anish Kapoor [a British-Indian sculptor known for large, stainless-steel works such as *Cloud Gate* in Chicago], for example, necessitates light reflected off adjacent surfaces—the smaller surfaces of a watch should be lit directly to accentuate its aesthetic.

Our work with Patek Philippe has influenced our approach to several retail projects. The G40 spotlight has since been installed at G Collins & Sons in Royal Tunbridge Wells in Kent, England, and at Symbolic & Chase on Old Bond Street in London.

Multiple lighting sources allow precious materials to sparkle.

Window-display illumination is controlled via Bluetooth for extra security.

ASK AN EP

NEHAR AGNIHOTRI

This class-of-2026 graduate student at **Parsons School of Design** discusses the impact of light as a constant amidst a changing landscape.

Why light?

I saw the power of intentional lighting in my own life and the potential it holds for people in public spaces. Through living in 11 cities, shifting skies, and unfamiliar streets, my table lamp remained constant. In its glow, my world took shape. It carved out a sanctuary, a circle of clarity amidst the blur of continuous change. When illuminated, the lamp turned the unknown into the known—and made it feel like for a moment, the world beyond its light could wait. I chose to pursue a Master in Lighting Design to learn how to work with this magical medium for its ability to make or break anything.

> “I want to create immersive and experiential work

The best part of your job and/or studies?

Every project is a new discovery. Some challenge, some immerse, and some leave a lasting impact, but all teach me something new. The most rewarding moments are when light becomes more than just illumination; it transforms into a language, an artistic medium that shapes architecture, emotions, and perceptions. The process of exploring its potential, pushing its boundaries, and seeing its impact unfold is what excites me the most.

What is your favorite project?

One of my most fulfilling experiences was a recent team installation where we manipulated a partition to act as both a mirror and a glass, using its reflective and transmissive properties. People sitting on either side of the partition could see their own reflections yet still sense a connection with the people on the other side. The result was a ghostly, almost surreal interaction, where light blurred the boundaries between the self and others. Watching visitors engage with this piece, seeing their surprise, curiosity, and quiet moments of realization was invigorating.

The biggest obstacle you have encountered?

I often find myself in situations where people think I’m some kind of magical lamp fixer! As much as I’d love to wave a wand and fix their broken lamps or get the wiring on their luminaire back in shape, I’m not quite equipped for that. The question *Can you fix this?* is a bit of a running joke, and I always need to clarify that I’m not yet offering home repair services.

What is an important consideration for the future of the lighting industry?

In some parts of the world, light remains an afterthought, its potential unnoticed and its power untapped. Yet, light can create beauty in ways we often take for granted. As I delve deeper into the industry, I’ve come to realize that good lighting is not always accessible to all. This raises an important question: How can we share this knowledge, making the magic of light available to a wider audience? Finding ways to bridge this gap would be a challenge worth pursuing.

Do you have a dream job/project?

A larger-than-life experience that gives people goosebumps! Just like the incredible light-space-artworks created by some of the world’s most visionary artists, I want to create immersive and experiential work. If I could weave in elements of nature? That would be the cherry on top.

The Emerging Professional column explores issues affecting younger lighting professionals and those new to the industry.

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Visit ies.org/ac for more information. Registration opens March 2025!

Photos: Garey Gomez

1. Photocells and time clocks maximize daylight and allow electric light to slowly reach 2700K in the evening.

2. Custom wall sconces, built on-site, provide ambient and accent illumination on adjacent wood surfaces.

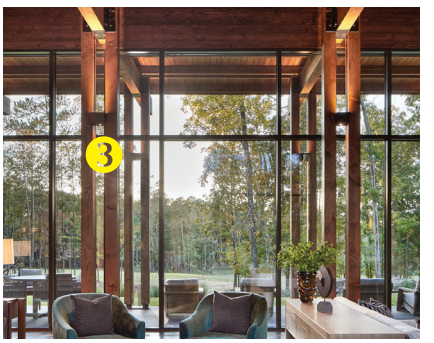
3. All hardware, transformers, and wiring associated with the custom sconces is concealed within wooden architectural structures such as vertical columns.

HOW THEY DID IT

IES ILLUMINATION AWARD OF MERIT

"Lake Oconee Gathering House"

A 6,000-sq-ft community space in Greensboro, GA, surrounded by lush forestry and signature boulders, glows like a lantern when the Sun goes down thanks to warm-toned, cost-conscious illumination by **Lighting Design Alliance**.



FROM CONVICTS TO COMICS

The National Taiwan Museum of Comics writes its origin story

By Craig Causer

Photos: Sen-Yung Liu

Over the past century, comic books have become modern American myths, many of which include unforgettable origin stories: last son of a dying planet, a young boy motivated by the murder of his parents, a radioactive spider bite, brainwashed and trained as an assassin by the Soviet KGB. While expressing a far more eastern artistic influence, the genesis of the National Taiwan Museum of Comics is no less fantastical, as it rose from the grounds of a former prison.

Taichung Prison included both a prison and dormitory complex, which were built in 1915 during Japanese rule and remained in use through the 1950s. The area continued to serve as judicial facilities during both the Japanese colonial and Kuomintang government periods and includes numerous historic buildings, such as the Warden's Residence, Bathhouse, Martial Arts Hall, and Official Residences. (The original radial cell blocks were demolished after the prison relocated in 1992, leaving the auxiliary buildings that are currently on site.) Repurposing the site was daunting, as the Warden's Residence and Bathhouse are designated "Municipal Historic Monuments," while the Martial Arts Hall and Official Residences are considered "Historic Buildings."

In April 2023, the Taichung Prison complex was approved by the Taiwan Ministry of Culture for

At Martial Arts Hall, the design bridges historical preservation and modern innovation, offering a timeless experience.

revitalization and repurposing, transforming it into a national museum that converted a once-closed space into an open public cultural venue. Moving beyond the concept of a single exhibition hall, the site encompasses 19 existing historical buildings within a landscaped park. In the future, a main building will be constructed on the northern side of the property, integrating comic collections, research, exhibitions, educational activities, a library, and animation cinema functions.

Just as comics are born through evolving imagination and creation, the museum aims to present artistic works of varying themes across generations within historical, new, and planned facilities. The vision is to showcase the vitality of Taiwanese comics through the intersection of past and current work while detailing themes of confinement and innovation.

"This lighting renovation project aims to breathe new life into historical architecture through nighttime lighting environment design," explained Ching-Yu Lin, lighting design director at CosmoC Lighting Ltd. "The carefully designed lighting successfully revitalizes a long-closed area while also evoking public respect for, and connection to, historical culture. This project not only enhances the aesthetic value of the city's nightscape but also transforms a previously isolated space into

The courtyard of Martial Arts Hall was transformed into a welcoming venue for cultural and public engagement.

a culturally significant public place, achieving an integration of historical preservation and modern functionality."

The museum required illumination for the large park area and the exteriors of the historical buildings. For the green landscapes, pathways, plazas, and parking areas surrounding the buildings, lighting equipment of various scales was deployed. Four custom 8-meter poles—each featuring eight LED floodlights (30 watts per floodlight, 3000K)—were installed in the parking lot. For green areas and tree illumination, 3.5-meter landscape poles with four to six LED floodlights (15 watts per floodlight, 3000K) were employed. Upward-facing tree floods were specified at 20 watts for LED and 30 watts for RGBW LED. To enhance glare control, the floodlights were equipped with honeycomb grids and anti-glare shields. All the project's luminaires were supplied by Fomolux Enterprise Co., Ltd.

Custom-designed, Japanese-style lanterns were added to building entrances to enhance the historical nature of the site. These lanterns contained E27 LED lamps (7 watts, 3000K) and were designed as symbolic architectural elements rather than functional lighting for the entrance area.

The Beauty of Light and Shadow

Integrating landscape and architectural elements to create a coherent and layered nighttime transformation experience was a primary focus that proved challenging. Since the space contains diverse elements such as vertical building façades, facilities, and large trees, each with different viewing distances and details, it was essential to showcase the light and shadow relationships between these elements.

During the day, visitors are bathed in natural light, experiencing the unique atmosphere created

Uplighting various elements in the environment creates distinct, layered visual effects after dark, adding depth and dimensionality to the spatial experience.

by the interplay of historical architecture and natural environment. As time progresses, the changing light and shadow bring rich and varied expressions to the space. As night descends, the imaginative and free-spirited characteristics of the comics theme takes center stage.

Taking advantage of the banyan trees and their prominent, exposed roots crawling across brickwork, RGBW uplights were installed for the two oldest trees in the park as well as those next to the Warden's Residence. The luminaires were programmed to display color changes corresponding to the seasons during the 24 solar terms throughout the year, which allows visitors to sense changes in time, illumination, and environment as they flow between the past, present, and future on display.

"To create appropriate visual contrast and a harmonious light environment, our team conducted precise 'light tuning' work during the final completion phase," Lin stated. "We carefully observed the light and shadow effects from each viewing angle along the main visitor routes, ensuring through detailed luminance adjustments that landscape lighting naturally guides visitors' sightlines while complementing architectural lighting. For example, we reduced the illumination of certain landscape paths [5 to 10 lux] to highlight the light and shadow details of important building façades; meanwhile, we enhanced landscape lighting at key nodes to create visual focal points and guide visitors' movement paths."

The contours of buildings are also illuminated to highlight architectural features and offer a distinct evening experience. This approach is an homage to the "emphasized outlines" technique that is prominent in comics, and it was designed to create "storytelling illumination" that connects historical architecture with modern comics culture. Two beam spread angles were used to achieve

Subtle lighting reveals layered roof tiles, blending with the surrounding trees and plants, and highlighting the coexistence of architecture and nature.

the desired visual effect: 12-deg narrow-beam floods were used to accentuate the outlines of the rooftops, while 30-deg wide-beam floods reduce overall contrast and provide a softer illumination for the entire building façade.

Comics Without Collateral Damage

Based on the requirements of Taiwan's Cultural Heritage Preservation Act for historical buildings, exterior illumination was not that simple. For example, all fixtures mounted on buildings must adopt reversible installation methods and cannot result in any damage to the building's surface materials. The installation of roof lighting systems was particularly challenging, so CosmoC Lighting employed custom metal clips to secure fixtures to the edges of roof tiles using a "clamping" method and properly arranged concealed power lines.

"Furthermore, to achieve optimal lighting effects, we needed to avoid unnecessary hot spots caused by fixtures being positioned too close to the illuminated surfaces," Lin added. "Therefore, the direction of illumination and the optical angles of the fixtures became critical considerations. Additionally, the size and paint color of the fixtures required special attention to avoid visual interference during the daytime or disrupting the original appearance of the buildings with their presence."

More than 90% of the fixtures employed are equipped with DMX controls, supplied by Signify Taiwan Limited, and integrated into a nearly site-wide system that manages all architectural and landscape lighting effects. Lin stated that this level of comprehensive intelligent lighting integration is "extremely rare in Taiwan's public landscape spaces." In the select areas where RGBW color lighting technology was utilized, the control system provided light intensity contrasts, making the overall environment more cohesive through the connection of light while avoiding a visually fragmented experience.

"We have also designed intelligent adjustment solutions for different nighttime periods, enabling some fixtures to automatically turn off or dim at specific times," Lin explained. "We hope this sustainable design not only ensures the artistic and functional aspects of lighting but also reduces energy consumption, demonstrates environmental responsibility, and supports the long-term preservation and sustainable use of historical spaces."

Internal Motivation

This project's scope consisted of specifications for all indoor exhibition lighting fixtures and track positions as well. Since each individual building is relatively small with somewhat fragmented interior spaces, to achieve maximum flexibility, all indoor exhibition lighting fixtures are track-mounted and feature individual dimming capabilities and interchangeable optical projection angle heads.

To accommodate the diverse requirements of the exhibition space, two color temperature options were provided for the track-mounted floodlights: 3000K and 4000K. Each luminaire is equipped with 12-W LEDs and features manual dimming via an integrated dial. A variety of beam spread angles are available, including 10, 20, 25, 38, and 50 deg, to support flexible lighting layouts across different zones of the exhibition.

"Beyond the fixtures' adaptability to various requirements, I believe one of the key factors in

The lighting echoes the museum's theme, introducing a playful yet elegant narrative to the space.

successful museum lighting is the relationship between track positions and the corresponding display objects' locations—this aspect was carefully considered under each different condition, Lin said. "Additionally, since all buildings have numerous windows that affect the overall visual effect of exterior architectural lighting, we undertook considerable coordination work to achieve appropriate balance, such as helping adjust interior light intensity or projection directions, ensuring the park's overall light environment maintains balance during nighttime."

In brightest day or blackest night, the National Taiwan Museum of Comics has transformed from a shuttered prison facility into an open public space, creating value for visitors, Taichung, and Taiwanese culture. For visitors, the carefully designed lighting system provides a safe and comfortable nighttime environment while also establishing emotional connections to historical architectural features. For the Taiwanese government, as the owner, the museum promotes regional revitalization, enriches the city's cultural content, and drives additional tourism to the area. The repurposing of the space is a fitting splash page for a story that continues to be written. ◎

THE DESIGNERS | Ching-Yu Lin, CLD, IALD, is the lighting design director at CosmoC Lighting Ltd.

Kuo-Chan Huang is a senior lighting designer and project manager at CosmoC Lighting Ltd.

Chia-Jung Lu is a senior lighting designer and team leader, Design Planning Team at CosmoC Lighting Ltd.

Jr-Yuan Ho is a senior lighting designer and deputy team leader, Design Planning Team at CosmoC Lighting Ltd.

Jie-Yu Huang is a senior lighting designer and team leader, Detail Design Team at CosmoC Lighting Ltd.

Jun-Yan Wang is a junior lighting designer, Detail Design Team at CosmoC Lighting Ltd.

Yu-Ling Huang is a junior lighting designer, Detail Design Team at CosmoC Lighting Ltd.

Ruei-Han Chang is a senior lighting designer and team leader, Multimedia Design Team at CosmoC Lighting Ltd.

Hui-Ning Lee is a junior lighting designer, Multimedia Design Team at CosmoC Lighting Ltd.

Photos: Richard Capsole

DAYLIGHT AT THE MUSEUM

The Yale Center for British Art lets the (diffused) sunshine in

By Michele Zimmerman

New Haven, CT's, Yale Center for British Art (YCBA), home to the largest collection of British art outside the UK, reopened in March 2025 after a three-year renovation and a two-year closure. The institution includes a vast collection of 35,000 rare books and manuscripts dating back to the 15th century, 20,000 drawings and watercolors, 2,000 paintings, 250 sculptures, and more works, as well as the building's updated lighting design.

The $16.5 million conservation project, upholding the historic aesthetic created by American architect Louis I. Kahn and original lighting design by American designer Richard Kelly, now features a new liquid-membrane roof with stronger domes to replace more than 200 acrylic skylights, laylight cassettes with removable films to diffuse sunlight, and an LED system—which required the retrofitting

of more than 600 fixtures and the replacement of nearly 7,000 linear ft of halogen track lighting. The detailed renovation is the result of collaboration from an internal team within the YCBA as well as a slew of the museum's partners.

It Takes a Village

Colleagues from art conservation, building conservation, communications, curatorial, installation, external affairs, registrar, visitor services, and security and operations worked in tandem to plan for the update of the modernist-designed building constructed in 1977. To aid the internal team through the initial analyses of energy reduction and light mitigation, fabrication, and installation of new fixtures, a squad of external partners stepped in, bringing the house of priceless works from the past into the 21st century.

Left: A view of the museum's roof with new skylight domes and original louvres .

Right: A mid-project view of the skylights without cassettes but with original light fixtures.

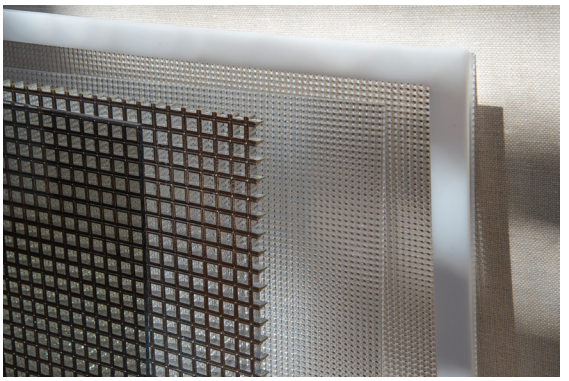
"The Center has benefited from the expertise and dedication of C-White Electric; EwingCole; Grand Light; Knight Architecture, LLC; Lighting Services, Inc. (LSI); Southport Engineering Associates; and Wiss, Janney, Elstner Associates, Inc., as well as Deborah Berke and numerous other collaborations," explained YCBA's Head of Museum Initiatives and Building Conservation Dana Greenidge. For example, "we worked with EwingCole, a nationally recognized architecture, engineering, and interior design firm to assess options for light mitigation to design an insert for our light-diffusing laylight cassette system," continued Greenidge. "They also helped us identify a lighting manufacturer to replicate the original track and fixtures: LSI."

Another player on the team, Connecticut-based Knight Architecture, was essential in thinking through the lighting design with LSI and worked

with Southport Engineering Associates to develop a new track system. “Deborah Berke and George Knight provided consultation on design and scale of the new fixtures, advising on decisions about how to maintain Kahn’s original aesthetic,” explained Greenidge. Additionally, Wiss, Janney, Elstner Associates, Inc. “helped structurally develop the light track and designed a 100% pull-test to ensure the track was safely supported by the connection boxes adhered to the concrete.”

Top: A mid-renovation image of illumination from skylights before the diffusing cassettes were placed.

Bottom: A close-up view of the new cassette system.



Raising the Bar on the Roof

Kahn’s blueprint for the YCBA included 224 acrylic skylights, centering the museum guest experience not only around art but also the interplay of light and structure. A combination of external and internal improvements ensured the unique experience was preserved along with the longevity of the museum’s structure and internal contents.

The roof, which was last worked on in 1998, now comprises four layers: two plies of fiberglass-reinforced SBS-modified bitumen (a lightweight, flexible roofing option made of rubber and asphalt) set in adhesives atop existing two-ply SBS-modified bitumen insulated roofing assembly. To finish the job “penetrations and other transitions were flashed with a reinforced liquid membrane that conforms to the exact substrate contours at the site,” said Greenidge. This external addition “maximizes the puncture and tear resistance performance of the overall roof system.”

The skylights, now made with more resilient polycarbonate domes in the same shapes of their previous acrylic iterations, ensure that galleries and guests benefit from as much natural light as possible—a key part of Kahn’s original vision. “Compared with many other museum renovations, the most remarkable aspect of our project is that when the Center [reopened], it [looked] almost exactly the same,” said Greenidge. “Our focus

New skylight domes above the entrance court.

was not on making major, recognizable changes, but preserving and renewing our existing spaces. While most visitors may not notice the nuances… they will experience the beauty of encountering [the] collection as Kahn intended for it to be seen, within elegant skylight galleries restored to their original vitality and luster."

Beneath the skylights lie a total of 832 acrylic laylight cassettes that diffuse sunlight, protect artwork on display, and change how guests may view the work as the day goes on. However, the team took the design one step further. "Working with EwingCole's Cultural Projects and Lighting teams, the Center performed a thorough analysis before embarking on a plan to mitigate the collection's exposure to sunlight to better align with current art conservation standards," explained Greenidge. "Rather than placing a tinted film directly on the new skylights or the newly fabricated cassettes, a film-treated acrylic panel was designed to fit within each new cassette's system, resulting in a roughly 30% reduction of daylight. The addition of the insert is in line with the Center's building conservation ethos as it can be easily adjusted or removed entirely to restore the daylight to its original condition."

It's Electric

Though one could say the Center revolves around the Sun in many ways, it is also true that electric light plays a key role in the new iteration of this free-to-the-public museum, as it does in many exhibition spaces. "Converting our lighting from the original halogen lamps to LED was not as simple as replacing lightbulbs. In order to retain the building's aesthetic while incorporating the new technology, we had to design a whole new lighting system," said Greenidge. The new system would need to remain compatible with existing wiring and mirror the design of the original track lighting. To achieve this, designers implemented Xicato LED Engines with high CRI and 10-year warranties for 611 retrofits, as well as 6,817 linear ft of track and 2,515 new light fixtures by LSI. An ETC control system to handle the entire institution's illumination, with programs made in collaboration with the YCBA installation department to focus on specific settings for exhibition spaces, was installed by Supertech, Inc.

"Our 2023–2025 conservation project is the most recent phase in our ongoing stewardship of the building," said Greenidge. "The project, like those before it, builds upon decades of research on the history of the design, construction, and renovation of the museum's landmark building, which was published in 2011 as *Louis Kahn and the Yale Center for British Art*: *A Conservation Plan* by Peter Inskip and Stephen Gee, in association with Constance Clement, former deputy director of the museum. As with previous projects, the recent work was guided by the ethos and principals outlined in the [text]."

To see the museum in it's newest form, and for more information, visit *https://britishart.yale.edu/*. ◎

THE DESIGN TEAM | Deborah Berke, Yale School of Architecture, served as a lighting consultant on the project.

C-White Electric served as the electrical contractor.

EwingCole served as the project's electrical and lighting consultant.

Grand Light provided lighting restoration for the project.

Institute for the Preservation of Cultural Heritage, Yale University provided lighting analysis for the project.

Knight Architecture served as the project's building conservation project architect and as a lighting consultant.

Lighting Services, Inc., Member IES, served as lighting designer, engineer, and manufacturer for the project.

Modern Plastics served as cassette fabricator for the project.

Southport Engineering Associates served as a consultant and electrical engineer for the project.

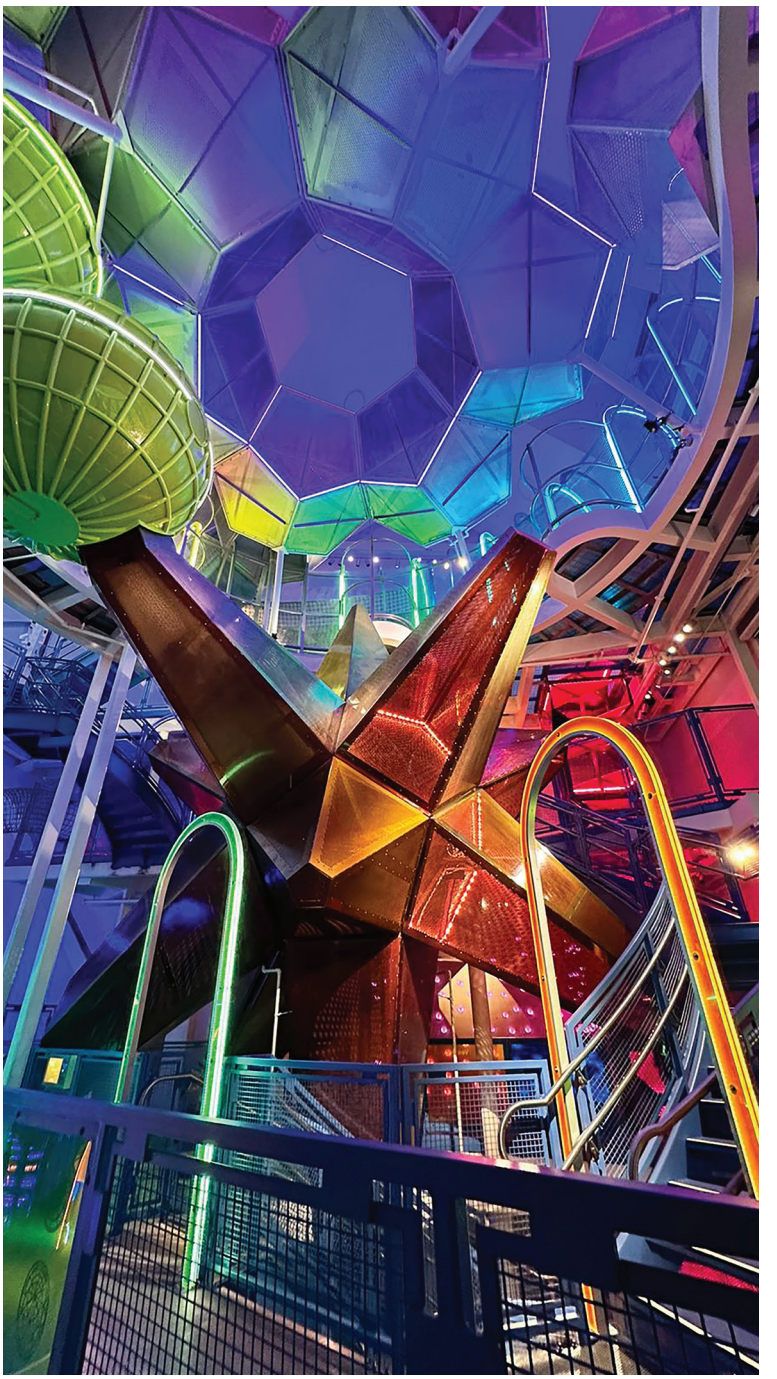
Wiss, Janney, Elstner Associates, Inc. served as a lighting consultant and structural engineer for the project.

Photos: Scott Weaver

KEEP YOUR HEAD IN THE CLOUDS

Atypical design allows everyone to have fun at La Nube

By Michele Zimmerman



What were your childhood dreams? Flying high above your hometown in a homemade airplane? Exploring the depths of a mysterious cave? Becoming a rockstar? STEAM discovery center, La Nube, in downtown El Paso, TX, makes such ambitions more realistic for people of all ages, abilities, and cultures. With the goal of encouraging imagination through merging the educational aspects of a science center and children's museum experiences, the four-story, cloud-shaped institution promotes "Blue Sky Thinking"—a notion that the sky connects everyone and that the possibilities are limitless.

Left: The indoor climber featured in a neurotypical light setting.

Right: In low-stimulus mode, exhibit lighting shifts to a blue color scheme.

The playful museum comprises nine themed learning zones that blend science, technology, engineering, art, and math with interactive exhibits. These include the Anything's Possible Climber, which allows visitors to brush up on math skills while climbing the tallest, inclusive indoor climber in The Lone Star State; Our Sky, an exploration of the nighttime sky and weather patterns; Desert Bloom, a quiet, shoe-free zone

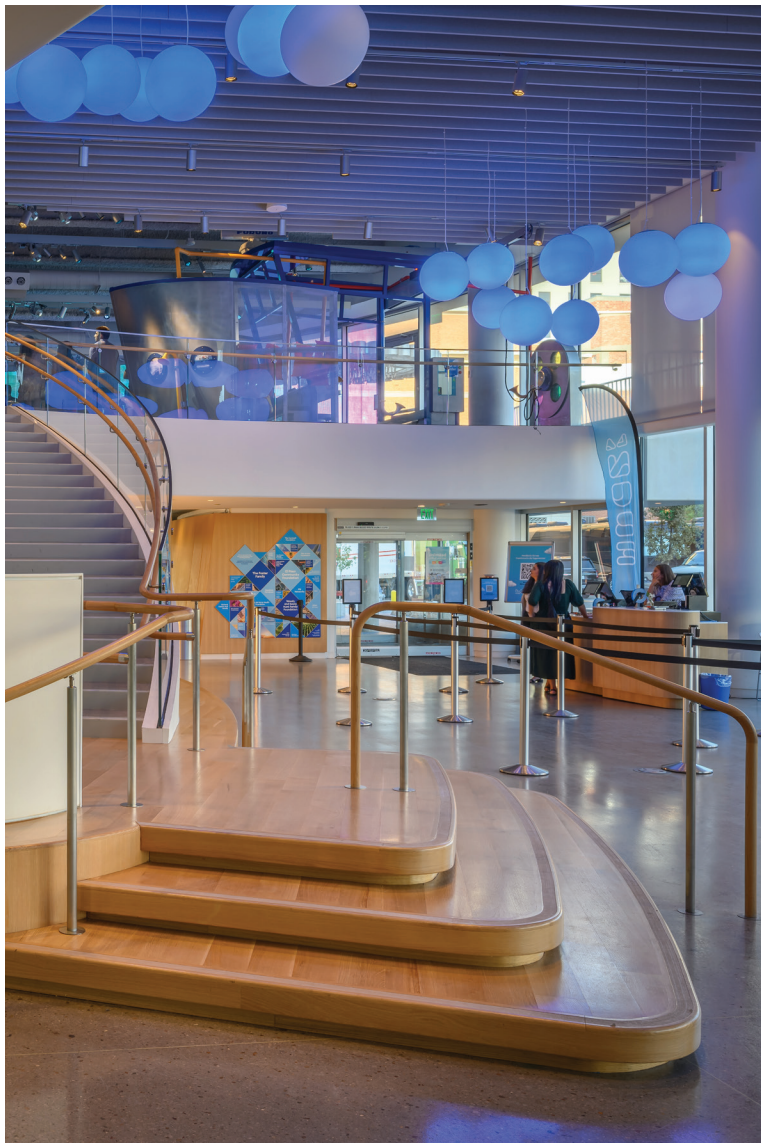
Desert Bloom caters to the youngest crowd visiting La Nube.

for infants and toddlers; Follow Your Instincts, an area for role playing and constructing animal habitats replete with a glow-in-the-dark cavern; Fly High, for leaning about gravity through a paper-airplane-making-station and an Air Space Testing Facility; Puzzle It, with solvable problems in English and Spanish; Making Waves, a space for recording music, videos, and learning to code; Flow, a water-play center; and finally, Challenge It, for learning about robotics, 3-D printing, and more.

With a price tag of $72 million, the private-public partnership project of the El Paso Community Foundation, the City of El Paso, and other community stakeholders, opened its doors in 2024 after parents, educators, therapists, and other community members had a hand in sharing expertise to influence the space along with exhibit design firm Gyroscope and architectural firm Snøhetta. The result: a facility that provides thoughtful accessibility such as bilingual signage, topographical maps for the visually impaired, Sensory Kit backpacks and items like noise-canceling headphones, Sensory Cozy Rooms throughout the museum to help reduce overstimulation, and regular sensory-friendly lighting hours that feature softer lights with reduced brightness. The museum also created weekly special events featuring book characters, National Park Service employees, and veterinarians.

The Playful Particulars

It's only natural that a unique environment such as La Nube, which is so committed to its theme that even its website features the baby photos of its CEO and other team members, would have a lighting design equally as detailed and fit for inclusive play. Thus, design firm Available Light was brought onto the team in 2019. "[We were] first brought onto the project as part of the exhibits team," explained Available Light Principal Rachel Gibney. "As the project evolved, our role grew, and we were subsequently integrated into the architects' team as well. Our expanded responsibilities then included



Regularly scheduled sensory-lighting hours occur each weekend at the museum.

lighting design for architecture, exhibits, and the control systems integrating these elements. This comprehensive approach allowed us to deliver a cohesive and engaging lighting design that met the needs of the project."

Various challenges arose "in conceptualizing and actualizing this project, particularly around the complex interactivity and desire to remain accessible," added Available Light Principal Ted Mather. "For instance, [the firm] needed to be educated as to what 'low stimulus' meant, and how one could design lighting that could accommodate those with special needs. Typically, the aesthetic of a children's museum is bright, loud, and intended to be as stimulating as possible—and to be frank, it's a rare client request that the design team initially sets out to accommodate accessibility lighting design strategies in its brief."

To illuminate the 29,000 sq ft of exhibit space, the team implemented a flexible and dynamic system with DMX-controlled static-white and color-changing trackhead fixtures (by Lighting Services, Inc.) located above and integrated within exhibit components including the multi-story climber. The system, with multiple layers of control, allows for static looks, pre-programmed effects, interactive lighting elements—and the accessible "low-stimulus" mode.

"During several pre-set times, as well as on-demand on an exhibit-by-exhibit basis, museum staff can modulate the lighting to 'low-stimulus' mode, which adjusts the lighting in multiple ways to make the exhibit more friendly to those with neurodivergent needs," explained Mather. "In general, light levels decrease slightly and exhibits with saturated colors either desaturate slightly or shift towards blue. Exhibit galleries with significant interactive elements also change but are designed to do so in a manner that is not exclusionary. For instance, one location includes a mirror ball that, in [regular] operation, is triggered via an individually assigned RFID [radio-frequency identification] device. Upon check-in, the mirror ball starts spinning and lights aimed at the ball turn on for several seconds, then turn off—yielding a visitor reward. Rather than removing this effect, which would exclude those with special needs from a delightful moment, the design simply removes the interactive element, the mirror ball constantly spins. In this way, an individual is finding fun and excitement through the effect, but [the effect] does not suddenly stop—which could result in adverse visual stimuli."

While museums are exempt from adhering to specific lighting energy codes, the team continually referenced local and national energy codes throughout their process at La Nube, ensuring that the sophisticated system took not only the well-being of neurodivergent guests into consideration but also the well-being of the planet. The team was able to complete the project with an exhibit lighting power density of less than 1 watt per sq ft.

Inside Out

The curved shape of the center presented its own challenges; it's not every day that designers must illuminate a cloud. "The building façade design presented a fantastic canvas for the [lighting] design team to create a truly breathtaking visual experience," said Gibney. To create a wonder-inspiring experience for guests to match the experience they have inside the building, as well as connect the

Fiber optics create a twinkling-star effect on the museum's façade.

structure to the El Paso skyline and community, the team sought to craft a twinkling, "starry night" theme outside. Using drawings, a full-scale mock-up, and fiber optic lighting solutions (by UFO Lighting) with three different fiber tail sizes (0.75, 1, and 1.5 millimeters), the team crafted an intricate pattern with over 2,100 points of illumination to recreate a constellation of stars. "From the precise calibration of light intensity to ensure an even distribution of illumination, to the careful placement of each fiber optic point, every element was carefully considered to create a cohesive and engaging visual effect," explained Gibney. "To control the fibers and bring the 'stars' to life, DMX control was used. This allowed for programming and presetting different twinkling movements, which can be tailored to respond to specific events or programs happening in the city."

From its surreal outside façade to its whimsical interior, there's no question that La Nube is a place made by and for dreamers, and that with the right design team—the possibilities are, indeed, limitless. ◎

THE DESIGNERS | Rachel Gibney, Member IES, is a principal at Available Light.

Ted Mather, Member IES, IALD, is a principal at Available Light.

John Delfino, Member IES, IALD is a senior associate at Available Light.

Alex Fabozzi, Member IES, is a senior associate at Available Light.

Matt Zelkowitz, Member IES, is a principal at Available Light.

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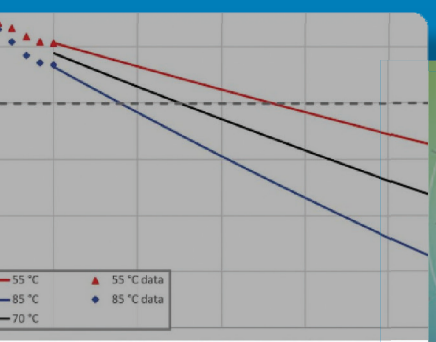
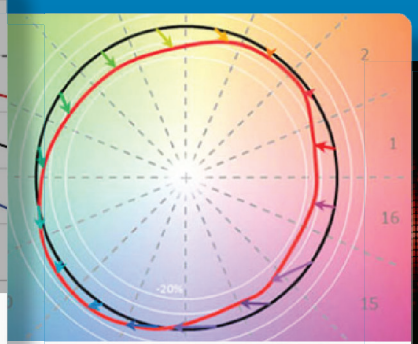


TM-21 Calculator

The official IES TM-21 calculator projects luminous flux maintenance based on the 2021 American National Standard, approved and maintained by the IES Testing Procedures Committee.



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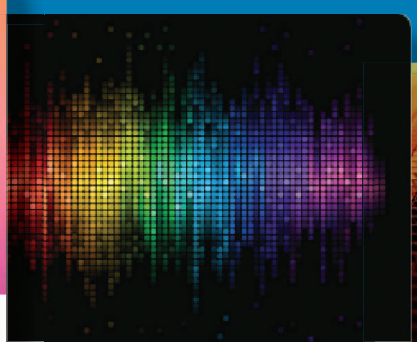

The Illuminance Selector

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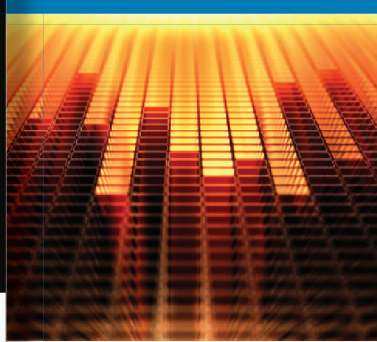

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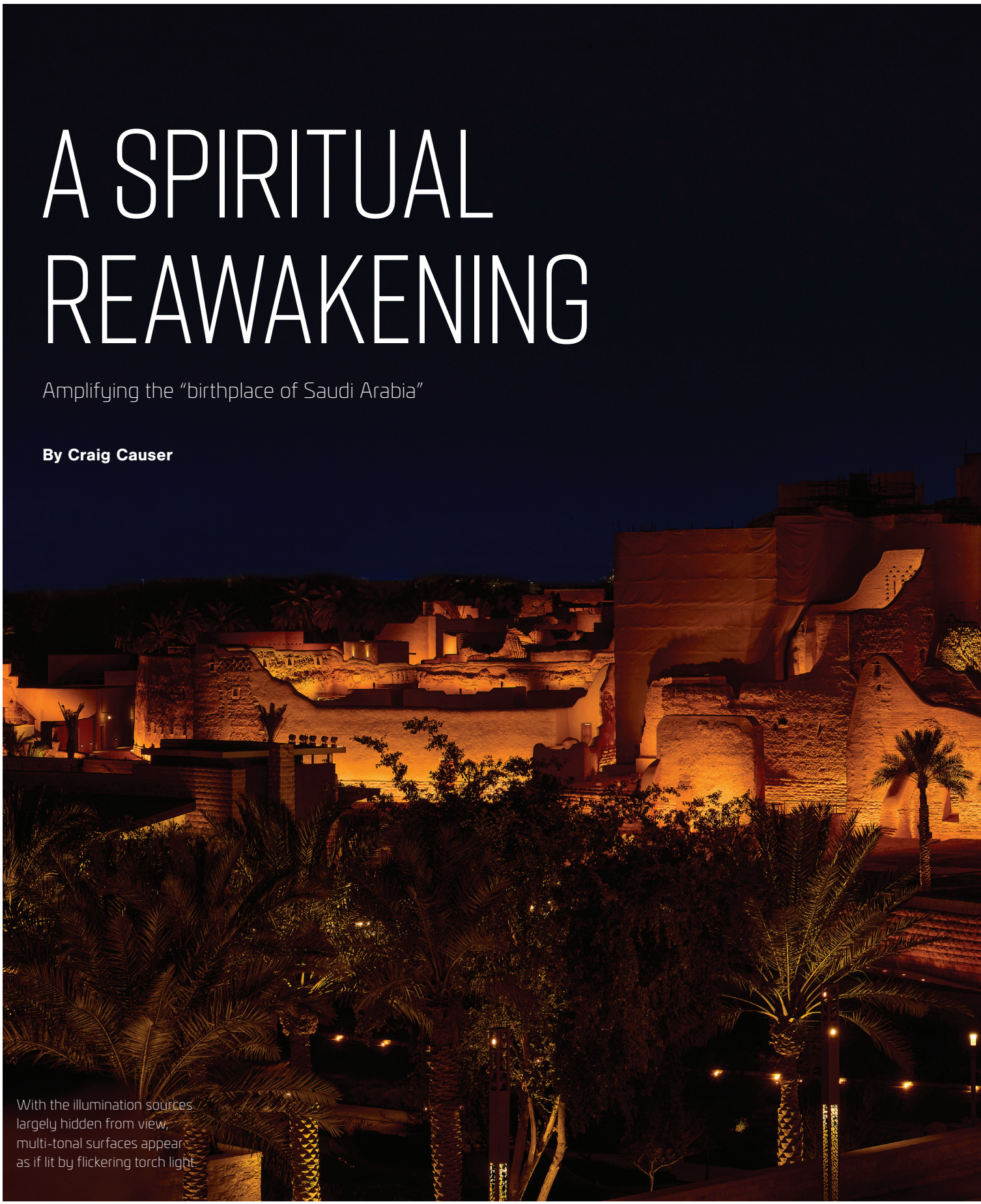
A SPIRITUAL REAWAKENING

Amplifying the "birthplace of Saudi Arabia"

By Craig Causer



With the illumination sources largely hidden from view, multi-tonal surfaces appear as if lit by flickering torch light.

Photos: Allan Toft/Martin Professional

While many museums offer a glimpse into the past, there is different atmosphere when one stands among history. Founded in the 15th century, At-Turaif District in Ad-Diriyah was the first capital of the Saudi Dynasty and was named a UNESCO World Heritage Site in 2010. It is home to numerous palaces and is an example of Najdi architectural style, which adopts the use of local materials such as mud and straw and features Islamic art-inspired geometric designs. Known as the "birthplace of Saudi Arabia," At-Turaif's remains stand as a location of significant cultural importance.

"The site and surrounding area are currently being developed by the Diriyah Company as a premier gathering place that offers an immersive Najdi experience for locals and tourists alike," explained Keith Bradshaw, senior partner and chief executive officer at Speirs Major Light Architecture (SMLA). "In its raised position, the site is the major focal point in the landscape when viewed from the residences and leisure facilities of the Diriyah Project across Wadi Hanifah, so creating an after-dark image and identity that befit the cultural significance of the site was crucial. But at its heart, the brief was about shaping a magical, emotional experience of

The lighting supports an immersive experience while creating a visual identity from mid and distant viewpoints.

this profoundly spiritual place after dark, when the temperature is more conducive to exploration."

Prior to SMLA's involvement, only a small area of At-Turaif had been illuminated, and that lighting was replaced as part of a holistic redesign for the entire site. A "thought piece" was created for the project, which focused on the way that light could amplify the story of the site and bring this remnant of a historic civilization back to life.

Doing so involved using light to capture and reveal the spirit of what was there, connecting people, place, and architecture across time to create a sense of At-Turaif as it was—a real city with inhabitants. To amplify the sensation of stepping into another time and place, it was important to remove 21st century influence as much as possible, so SMLA animated the subtle tonal variations in At-Turaif's natural materials to make them feel as if lit by flickering lantern light. To create the illusion that the light is coming from the buildings and the walls themselves, luminaires were concealed at ground level. The resulting effect feels like the city is glowing from the bottom up.

Having identified the surfaces, façades, streets, and courtyards that shape the site's most important views and experiences, SMLA modeled and tested lit effects in 3-D with an eye on delivering a memorable visual identity from a distance as well as a seamless authentic experience inside the site. Working with a palette of differing light intensities, a nuanced tapestry of layers and zones were developed and choreographed to better immerse visitors in an authentic space that feels as it did 500 years ago.

"The rough materiality of the handmade, mud-brick walls that shape the city contributes a great

The design derives inspiration from the natural color and textural qualities of the building fabric.

deal to the ambience," said Bradshaw. "We were enchanted by this very particular, almost-sand putty material with a very fine grain texture that made up these beautiful freeform structures. We noticed that when the sunset caught the walls, they really resonated in the warm light. That set us on the path of hunting for the exact shade of artificial light that would allow the mudbrick to glow in that same, beautiful, natural, and appropriate way. We tested and experimented extensively and conducted a large-scale mock-up, eventually finding the perfect combination at the edge of a monochrome light that creates an intense rose-gold glow. There is some flexibility for celebratory color change for important civic events, and the site experiences a monthly activation of blue light to the exterior at the new moon—reflecting the lunar calendar's importance in the Muslim faith."

Balancing the Scale

At-Turaif being a district, and not a single structure, presented challenges in many regards. The site's cultural and historical significance, as well as its tourism value, required SMLA to navigate a wide range of expectations and gain approval from multiple stakeholders, including the client, UNESCO, and Saudi Arabia's Ministry for Culture and Heritage. The site was frequently unavailable due to visiting VIPs, which affected both logistics and planning.

Crafting a nuanced three-dimensional experience and lit image for what is essentially a small city was a significant task, according to Bradshaw. "We facilitated our holistic approach to the design by using advanced 3-D modeling and rendering technology. Using a full drone scan of the site, we developed a workflow based on Hollywood CGI techniques. Within the 3-D model, we accurately created and tested lit effects from different viewpoints, generating exceptionally realistic renders, which were helpful in demonstrating our ideas... prior to completing a large-scale mock-up."

The region's desert climate also presented significant hurdles. At-Turaif, which is located northwest of the capital of Riyadh, experiences sweltering summer heat as well as flooding, which typically occurs from October to May. As a result, SMLA opted for luminaries from Martin Professional that could withstand 110-deg Fahrenheit

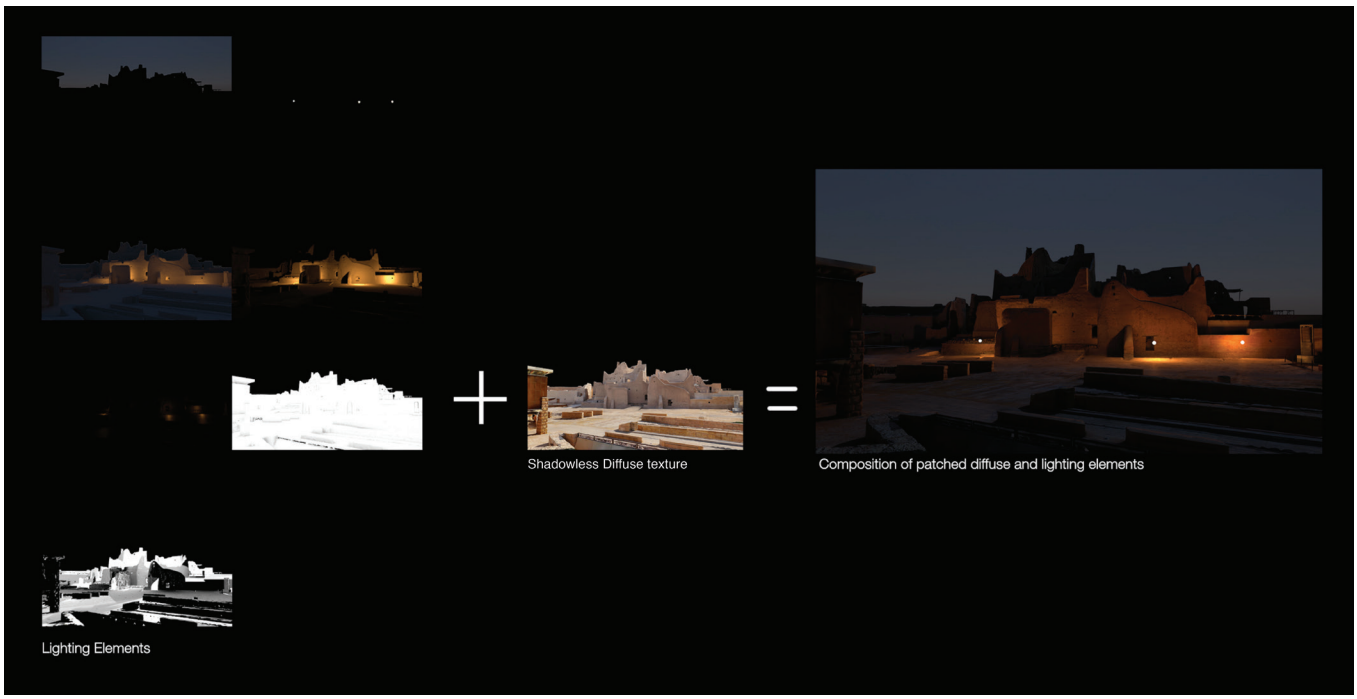


Photo: SMLA

temperatures and included fully drainable, double casements to withstand flash flooding.

"To avoid damage to the delicate mud-brick construction, lighting equipment is not fixed to any structure but secured on semi-recessed concrete ground footings surrounded by gravel that acts as drainage, protected from water and shielded from view," noted Adrien Flouraud, design associate at SMLA. "The shields are unobtrusive and carefully color-matched to the building fabric, so they blend into the background. We also took care to remove existing cabling and conceal new cabling to preserve the immersive nature of the experience."

The control network design was also complicated due to the size and phased nature of the design; the total area for all stages of the project is approximately 958,000 sq ft. The controls were provided by Pharos, and to manage the number of addressable points—approximately 30,000 DMX addresses running just under 3,000 RGBW fixtures—as well as the heritage restrictions on cabling installation, SMLA developed a distributed system and an interface that allows for the adjustment of individual effects at the level of nuance required. Sustainability was also a consideration; the site features a balance of light and darkness to tell At-Turiaf's story with minimal energy use while employing precision distribution and control to preserve dark skies.

"Visiting the site a night has become incredibly popular as an attraction, and reviews on tourism websites and posts on social media specifically mention the beauty of the lighting," Bradshaw said. "However, we are most proud of the response from the locals, who have conveyed that to them, our design perfectly captures the special spirit of the site, gifting them an experience that reinforces and enhances their emotional connection to this extraordinary site." ◎

The 3-D, CGI visualization process for At-Turaif, showing the texture rendering and overlapping lighting model over the 3-D scanned model.

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LD+A

LIGHTING DESIGN and APPLICATION

Share Your Voice

The flagship publication of the Illuminating Engineering Society, *LD+A* is an award-winning magazine for professionals involved in the art, science, study, manufacture, teaching and implementation of lighting. In an effort to continue to provide diverse voices in *LD+A*, we are looking for **industry professionals** who are interested in telling their stories, including work on unique lighting projects, their experiences in the profession, and opinions on current hot topics in the world of illumination.

EVERY ISSUE of *LD+A* includes feature articles on design projects, technical articles on the science of illumination, new product developments, industry trends, news of the Illuminating Engineering Society, and vital information about the illuminating profession.

EACH MONTHLY issue features a unique theme such as sustainable design, retail lighting, roadway lighting, industrial lighting, hospitality lighting, or office and commercial lighting.

ROTATING COLUMNS cover topics including energy, green design, career issues, technology, regulations and legislation, research, and education—written by a veritable who's who of industry experts.

If you are interested in publishing an article in *LD+A*, please reach out to Editor-in-Chief Craig Causer at **craig.causer@sagepub.com** to discuss further.

Illuminating ENGINEERING SOCIETY

MOMENTOUS AND MOMENTARY

Museums adapt to showcase new and ever-expanding stories

By Amy Nelson

Photos: The Metropolitan Museum of Art

Lighting in a museum is more than illumination—it is a form of storytelling; it directs the viewer's gaze, sets the mood, and guides perception. Proper lighting design not only elevates visual appeal but also preserves delicate works and steers visitors through an immersive, eye-opening experience. A museum is a time capsule, but it is not static. The Metropolitan Museum of Art (The Met), specifically, is a collage of 21 buildings puzzled together over the course of 140 years, which has expanded and contracted space to protect and display countless human-made objects that hold stories from across Earth, throughout time. Lighting must be adaptive, equally focused and flexible to illuminate, protect, and inspire an experience or discovery.

Museums are in motion, with labyrinths of galleries constantly being altered and rearranged. The stories, objects, and walls move with each generation longing to build upon or improve the narrative on display. Lighting is ephemeral—fleeting energy, easily extinguished—yet it has the power to transform space entirely. Museum lighting design is at the intersection of architectural lighting and theatrical lighting.

Lighting design is a craft that balances aesthetics, function, and conservation. The viewer is invited to enter and explore the space and the objects it holds. Therefore, lighting is positioned in one of two locations: above or within. From above, lighting infrastructure ideally comes in the form of a flexible track layout. Tracks running in a regular parallel orientation are preferred to maximize focus angles. Starting with a tight beam angle is

Charles Ray: Figure Ground: Bright light invites, energizes, and opens space.

beneficial. Lensing is a strategy to manipulate the beam shape and spread. From within, lighting should be integrated with the built environment, the decks, the casework, or the architectural elements. In most instances, these sources should not be visible, rather indirect, shielded, or diffused.

Museum illumination typically employs three key layers from above or within, including ambient, accent, and task lighting. Ambient lighting is for general illumination, safety, and wayfinding. It is used to unify, even, or flatten. Hierarchy can be lost if ambient lighting strategies are employed alone. Accent lighting highlights specific objects, details, and forms; it can direct the eye or create drama. Task lighting is employed for reading labels or interpretive content, writing, drawing, or transactional exchange. The most successful light is layered. Layering these techniques throughout in the forms of spotlights, wall washes, and indirect sources adds depth and dimension to both the object and the experience. Lighting is a tool to lead, shape, inform, and reveal.

The museum experience is both momentous and momentary. Together the museum and its lighting are ever changing. Good lighting can be taken for granted, but poor lighting is difficult to tolerate. Good lighting is as easy to anticipate as it is to ignore, but great lighting sings, it stops you in your tracks. Lighting can draw the viewer in to study details as well as push the viewer back to gaze in awe. Bright light invites, energizes, and opens space, while dim light calms, quiets, and creates intimacy. Spotlighting adds drama and focus, making shadows and contrast inherent—evoking mystery and depth. While spot lighting can add drama, it can also be layered on top of a wash layer to subtlety accent or render form, color, inscription, or other details.

Balancing Display and Conservation

A major challenge in exhibition lighting is balancing display with conservation. Many objects—particularly textiles, paper, and organic materials—are sensitive to light, and overexposure can cause irreversible fading. In addition, working closely with curatorial and conservation departments to limit light levels on sensitive works is essential, and exposure can be managed with scheduled lighting controls or by rotating objects throughout

Before Yesterday I Could Fly: An Afrofuturist Period Room: From within, lighting should be integrated with the built environment, decks, casework, or architectural elements.

the course of an installation. It helps to replace the object with a similar object in scale, subject, and finish to limit further impact to the display. Lighting-related conservation concerns are largely being eliminated with the advancement of LED technology.

LED has been the leading light source in the industry for at least a decade. It is efficient, produces minimal heat, has eliminated ultraviolet radiation, and demonstrates superior color-rendering technology. The intensity and brightness of LEDs should be managed with the use of dimming controls. In a museum setting, it is useful to have both zoned controls to unify and make sweeping changes, as well as onboard dimming control for more specific and incremental control.

CCT can play a role in the mood of an exhibition, and it may also unify a space or series of spaces, where there are already many unique and competing physical and visual conditions. Selecting a color temperature to establish and standardize a baseline white light is a necessary unifying element.

From Galleries to Capital Improvements

Lighting design at The Met looks a little different for each project type. Permanent galleries require much attention to fine-tune adjustments to respond to small scale changes in the gallery—the cause of displays being rotated are typically due to conservation purposes, incoming or outgoing loans, or to accommodate newly acquired objects. These adjustments are often executed with a basic focus and brightness adjustments, using existing infrastructure and

Lygia Pape: A Multitude of Forms: A main source of lighting is often from an existing flexible ceiling track layout.

equipment. Sometimes lamp replacements are necessary or accessories need to be swapped out to modify the beam. In many cases, permanent gallery changes can be completed in a single day if well planned.

Gallery reinstallation projects, on the other hand, require a longer lead time—often months or years of planning and design are dedicated prior to execution. Reinstallation projects frequently require construction—new casework and infrastructure upgrades. The existing ceiling track layout is studied, and upgrades are considered and proposed. Often, internal lighting is incorporated into new casework.

For special exhibitions, this process can take anywhere from 6 months to 2 years depending on scale and complexity. These shows are commonly high profile, can be loan heavy, and are temporary in nature. Bespoke design is encouraged to make the exhibition stand out from the permanent collection. The main source of illumination is often from the existing flexible ceiling track layout. Temporary casework can be lit from above or within via internal case lighting.

The most complex and longest lead-time endeavors are capital improvement projects. These are either total renovations or new construction and typically have an external design team with whom the in-house design team consult in the museum's interest. New systems are proposed that meet the museum's guidelines to either renew or add new gallery and back of house space to the museum footprint.

Designing light for museum projects must respond to movement—redirecting and illuminating an expanding story. Those telling the story must find a way to be intentional, block out the noise, and prioritize. Knowing when to work with what you have inherited and when to advocate for improvement is critical to growth and discovery, for the individual and the institution. ◎

THE AUTHOR | Amy Nelson, Member IES, LEED Associate, is the design manager of Lighting Design at the Metropolitan Museum of Art in New York City.

Lighting Quality Over Quantity: How Full-Spectrum LEDs Influence Lighting Preferences and Visual Performance

Lighting is essential to visual performance but also human health, mood, and overall well-being. A growing body of evidence underscores the importance of both the quantity and quality of light in shaping these outcomes. Traditional energy programs, such as those in California's Building Energy Efficiency Standards or federal ENERGY STAR specifications, have historically emphasized luminous efficacy. While this approach has driven substantial improvements in energy performance, it often overlooks color fidelity and visual comfort, which are essential for user satisfaction, positive functional outcomes, and sustained use of LED lighting in homes and businesses.[1,2]

AUTHORS

JONATHAN BRYANT, CORI JACKSON, AND JAE YONG SUK

While conventional LEDs often prioritize efficacy at the expense of color quality, recent advances in full-spectrum, high-fidelity LED lighting offer a compelling alternative. These next-generation LEDs more closely mimic natural daylight, delivering improved color rendering and higher TM-30-20 fidelity scores. The result is better visual comfort, enhanced performance in color-critical tasks, and even psychological benefits linked to perceived naturalness.

One key advantage is that full-spectrum LEDs may enable occupants to feel visually satisfied at lower light levels, opening the door to energy savings without compromising experience. To explore this opportunity further, the California Lighting Technology Center (CLTC) at the University of California, Davis, in partnership with Seoul Semiconductor, conducted a controlled study to evaluate whether high-fidelity lighting can reduce preferred light levels while preserving visual performance. By isolating the effects of spectral quality on both subjective preference and functional color discrimination, the study aimed to provide actionable insights into strategies for improving occupant lighting experience while supporting energy efficiency goals in residential and commercial settings.

Methods

The study included two experiments combined with a set of cross-sectional surveys. The first experiment addressed lighting preference using a within-subjects design to determine if high-fidelity, full-spectrum lighting produced a significant effect on preferred lumen output. The second test executed a color sorting task under the reference source and then the full-spectrum source to capture impacts of the lighting treatments on color discrimination. Following these experiments, participants completed three cross-sectional surveys to capture their subjective experiences, perceived visual comfort, and comparative preferences between the two lighting treatments at the time of the study.

Experimental Set-up

This experiment took place in a controlled laboratory environment designed to simulate a typical residential vanity space, such as in a bathroom or bedroom (**Figure 1**). The room measured 6 ft by 9 ft by 9 ft with neutral white walls used to minimize any influence of surface color on lighting perception. A high-quality mirror was installed to replicate a standard vanity set-up and reduce color shift due to reflected light.

The study used two LED sources: a high-fidelity, full-spectrum LED with a TM-30-20

Fidelity Index (Rf) of 97 and a conventional LED with an Rf of 84 (**Table 1**). Both were mounted behind the vanity's acrylic diffusers to ensure uniform illumination across the vanity surface. Researchers, located outside the test room, controlled source switching to maintain consistency.

Although the spectral distributions of the full-spectrum and conventional LEDs were different, it was critical that both light sources appeared identical in color to participants to eliminate any bias associated with perceived light color preference—common in human visual perception. The experiment controlled CCT at 3100K for both light sources. This was done using the 10-deg color space, where X_n,F,10 and Y_n,F,10 chromaticity coordinates were calculated from integrating sphere measurements. Researchers iteratively refined both sources until their chromaticity coordinates were closely matched, ensuring minimal perceptible difference in hue or warmth.

In addition, to isolate the effects of spectral quality rather than illuminance level, both lighting systems were calibrated to deliver an equal illuminance of 35 footcandles (~377 lux) on the task surface during the color sorting experiment. This ensured that performance differences could be attributed to spectrum fidelity rather than brightness.

Lighting Preference

To evaluate the impact of high-fidelity, full-spectrum lighting on preferred light levels, a paired-samples t-test was completed. The intervention involved a change in ambient lighting conditions used during task performance. In the reference condition, participants were exposed to the conventional LED lighting. The lighting treatment replaced the conventional LED source with the high-fidelity, full-spectrum LED alternative.

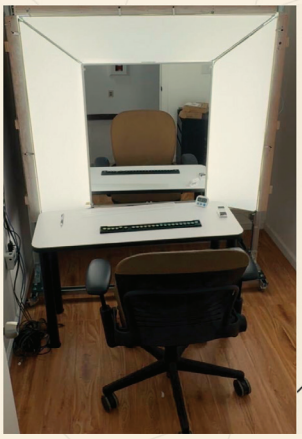

Photo: Veronica Then, California Lighting Technology Center

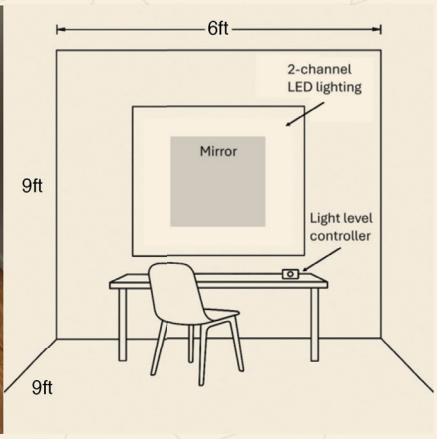

Figure 1. The experimental test space.

Table 1. LED Performance Characteristics

LED Type	R_f	R_g	$R_{cs,h1}$	CCT (K)
Full Spectrum	97	102	0%	3087
Conventional	84	93	-12%	3095

Photo: California Lighting Technology Center

Figure 2. A participant sorting the FM100 color tiles.

The test compared the mean preferred lumen output recorded before and after the lighting intervention across 50 participants (25 females and 25 males evenly distributed in different age groups from 18 to over 60). Participants completed a series of interactive lighting preference trials designed to measure individual perceptions of ideal lighting conditions. The order of exposure to each light source was determined in advance and randomized to minimize sequence bias.

1. Upon entering the test space, participants sat at a vanity station facing a mirror. The vanity lighting was set at its minimum level for the first test when participants entered the room.
2. Using a handheld remote dimmer, participants adjusted the light level in fine increments, increasing or decreasing the output until they reached a self-determined "ideal" illumination level, which was defined for the participants as the light level that felt most natural and visually comfortable for grooming-related tasks.

Each participant completed five repetitions under the full-spectrum LED and five under the conventional LED. A 12-V DC pulse switch was used to record the time at which the participant finalized their lighting selection. This timestamp was synchronized with real-time power monitoring data from the vanity luminaire, allowing researchers to accurately capture participant preference, nominal power (watts), and lumen output for each repetition.

Color Perception and Discrimination

Participants completed a color discrimination test using the Farnsworth-Munsell 100-Hue Test (FM100), a well-established method for evaluating fine color perception and discrimination, whereby participants attempt to arrange a tray of colored tiles by increasing hue.[3] Each participant sorted a complete set of hue tiles under one lighting condition, took a brief rest, and then repeated an identical sorting task under the alternate lighting condition (**Figure 2**). The order of the two lighting treatments was randomized across participants to minimize ordering effects. Participants were allowed up to five minutes per test to sort the tiles.

Upon completion, researchers calculated a total error score (TES) for each test using the Munsell hue number labeled on the back of each tile. TES is the sum of the differences between each tile and its two adjacent tiles. For example, a tile labeled 17 is placed after a tile labeled 19 and before a tile labeled 20. The difference value for tile 17 is $|17-19|+|17-20|-2 = 3$. Participants' test scores were grouped into one of three standard FM100 color discrimination tiers: superior (TES = 0-16), average (TES = 17-100), and low (TES > 100).[4]

Results

Participants in the lighting preference study had a mean score (preferred lumens) of 2,833 under the conventional, low-fidelity LED and a mean score of 2,323 using the full-spectrum, high-fidelity LED.

This reflects a decrease of 510 lumens, with a standard deviation of the paired differences of 554 lumens.

The paired-samples t-test revealed that the lumen reduction was statistically significant, $t(49) = 6.50$, $p < .00001$ (two-tailed). The 95% confidence interval for the mean difference was [352.6, 667.4], indicating that the observed reduction was unlikely due to random variation. An effect size calculation yielded a Cohen's d of 0.92, which is considered large according to conventional benchmarks. This suggests color fidelity and spectrum have a strong practical impact on people's preferred light level for certain indoor applications.

On average, participants preferred 18% fewer lumens when exposed to high-fidelity, full-spectrum LED lighting as compared to the conventional, lower-fidelity LED reference source (**Figure 3**). Although the full-spectrum LED source is characterized by a lower luminous efficacy as compared to the conventional LED source, participants' natural selection of lower light levels suggests potential energy saving opportunities for full-spectrum LED lighting in real-world applications.

Color Discrimination

No overall significant difference in color discrimination emerged between the full-spectrum LED source and the conventional LED reference when TES scores were aggregated across all participants and FM100 trays. However, certain trays—particularly those containing more subtle color transitions—produced modestly better scores under the full-spectrum LED treatment. **Table 2** shows the final count of individual tests binned into the three standard FM100 tiers.

Other key observations include:

- "Superior" test scores occurred twice as often under full-spectrum LED lighting as compared to scores resulting from tests conducted under conventional LED lighting.
- On average, female participants produced fewer color sorting errors than males regardless of the lighting treatment, echoing research on potential tetrachromacy in a subset of the female population.[4]

Participant Surveys

Over the course of the study, participants completed three surveys designed to assess subjective evaluations of lighting quality across both experimental conditions. In general, respondents rated the two lighting conditions as comparable in terms of perceived brightness, visual comfort, and overall attractiveness. However, a notable subset of participants described the full-

An Incentive for Quality Light

The DesignLights Consortium grants a 5 to 10% efficacy allowance for LED products that demonstrate superior color fidelity, rewarding spectrum quality—not just efficiency.

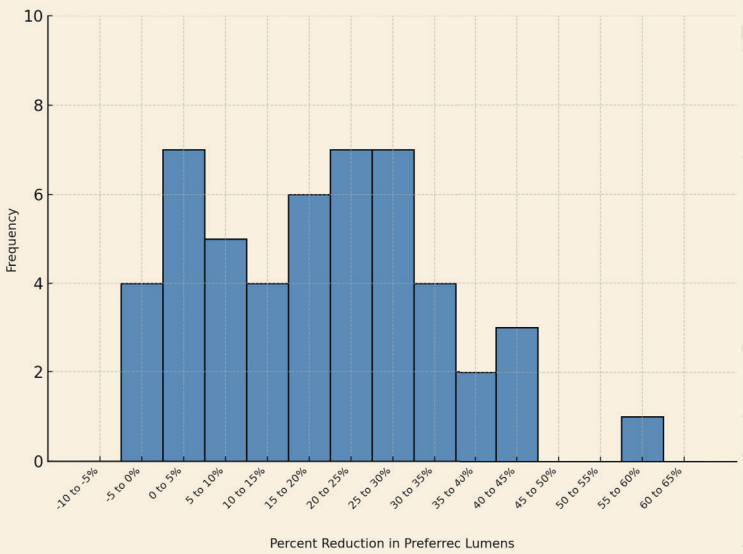

Figure 3. Participants' percent reduction in preferred lumen output for high-fidelity, full-spectrum LED lighting as compared to conventional LED lighting with lower color rendering.

Table 2. Count of FM100 TES scores for color discrimination tests

Farnsworth-Munsell Tiered Distinctions	Conventional LED	Full-Spectrum LED
Superior Discrimination TES ≤ 16	4	9
Average Discrimination 16 < TES < 100	40	34
Low Discrimination TES ≥ 100	6	7

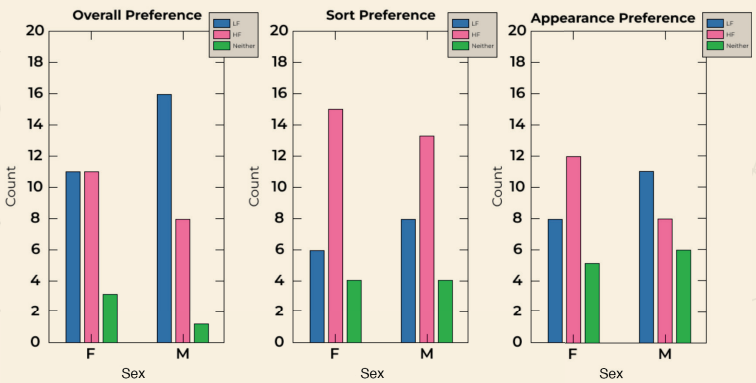

Figure 4. The significant differences in participants' overall preference, sorting preference, and appearance preference between full-spectrum LEDs and conventional LEDs.

spectrum LED lighting as feeling more "natural" or "better suited" for visually demanding tasks.

While most survey items revealed no significant differences in preference, three questions produced significant results (**Figure 4**) and revealed sex-related trends for this participant sample. Female participants were more evenly divided in their overall preferences for full-spectrum and conventional LED lighting, whereas male participants demonstrated a significant inclination toward conventional LED as their preferred option. When asked which lighting condition they would prefer specifically for color discrimination tasks, both sexes trended toward the full-spectrum LEDs, indicating a shared perception of its enhanced suitability for tasks requiring precise color perception. In the context of personal appearance, female respondents preferred full-spectrum LEDs, while males showed a preference for conventional LEDs; however, this distribution was more balanced compared to responses on overall lighting preference. The consistent trend across sexes favoring full-spectrum LED for the color sorting task suggests that high-fidelity, full-spectrum LED lighting may be more effective when accurate color rendering is essential.

Key Outcomes

- **Color fidelity and spectrum matter:** Color fidelity and spectrum appear to have a strong practical impact on people's preferred light level for certain indoor applications.
- **Reduced illumination demand:** A significant reduction in lumen output—quantified at an average of 18% for this study—may be possible when using high-fidelity, full-spectrum LED lighting, which may translate to meaningful energy savings.
- **Enhanced perceived brightness:** Participants frequently noted that full-spectrum LED lighting felt brighter and more comfortable at lower light levels.
- **Color-critical tasks:** Full-spectrum LED lighting showed small but notable advantages for tasks requiring color accuracy.
- **Biological sex:** Sex may play role in color preference for certain types of activities.

This research shows that high-fidelity, full-spectrum LEDs can create a more visually satisfying environment without requiring higher lumen outputs, opening the door to lighting energy savings. Improved color render-

High Fidelity

TM-30-20's Fidelity Index—which measures how closely a light source renders colors compared to a natural reference—was the primary metric used to characterize spectrum quality. An Rf of 100 represents a perfect color match. UL's Color Rendition Rating system defines an LED with color fidelity index (Rf) higher than 95 as "Diamond," while an LED with index score below 85 does not qualify for UL rating.

ing appeared to help participants perceive adequate brightness at lower light levels. While color sorting accuracy didn't consistently favor full-spectrum lighting, specific conditions—especially those demanding "superior" discrimination—highlight its advantages.

Spectral quality plays a subtle but significant role in both perception and energy use. Though full-spectrum LEDs may deliver fewer lumens per watt, participants frequently preferred lower illumination levels under these sources—which may potentially offset efficacy concerns. In real-world applications like offices, classrooms, bathrooms, or dressing areas, this self-selected reduction could rival or surpass savings from higher-efficacy but lower-quality light.

Industry leaders, including the IES and DesignLights Consortium, are increasingly recognizing the value of advanced metrics like TM-30. This research supports the case for efficacy allowances or added tiers for high-fidelity lighting products.

The positive response to full-spectrum LEDs in this study signals a shift: moving beyond one-dimensional efficacy metrics to prioritize human-centric, visually balanced illumination. ◎

THE AUTHORS | Jonathan Bryant is a Research and Development engineer at the CLTC.

Cori Jackson is responsible for planning, budgeting, scheduling, and monitoring CLTC research projects.

Jae Yong Suk is the faculty co-director of the CLTC and an associate professor in the Department of Design at UC Davis.

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PROJECT IN PICTURES

Portrait Perfect

After a three-year-long redevelopment project, London's **National Portrait Gallery** opened with a new entrance and "Inspiring People," a collection of art that merges historic and contemporary oil paintings, photography, and 3-D artworks. The restructured museum and new exhibit included illumination by **Studio ZNA** that carefully constructs a guided visitor experience that chronologically explores the works and transitions to match the varied atmosphere of each gallery. The project earned a 2024 IES Illumination Award of Merit.

Luminance levels on the first floor accommodate numerous mediums such as studies on paper, oil paintings, sculptures, and photos.

Particularly sensitive works are protected within **display cases with integrated lighting**.

Photos: Gareth Gardner

Bright illumination and strong accent lighting support the new entrance way full of **busts and sculptural works**.

Roof-lit galleries feature paintings from the 17th through 19th centuries. The mix of daylight and high-rendering spotlights allow for consistent illumination throughout the space.

Tudor Galleries present intimate viewing experiences; rich colors and dark backgrounds combine with **glowing illumination** to accent significant pieces.

All Eyes on IESNYC Student Lighting Competition

The IES New York City Section (IESNYC) crowned the winners of its Student Lighting Competition at LEDucation in New York City in March. This year's theme, "A Sight for Sore Eyes," challenged students to design lighting solutions that enhance visual comfort and mitigate glare.

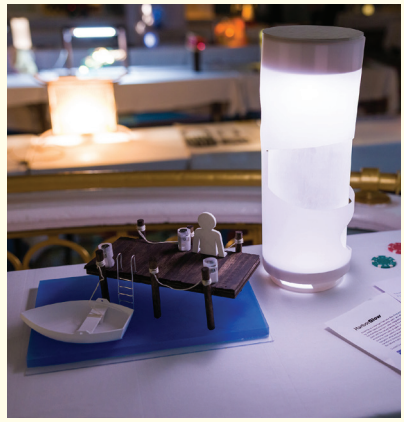
The Grand Prize and $5,000 was awarded to Veronica Gonzalez, Clay Mohrman, and Callie Walton from New York School of Interior Design for *Soluna*. Second Place and $2,500 went to Nidhi Jairam from Pratt Institute for *Harbor Glow*. Third Place and $1,000 was awarded to Nazakat Adigozalova and Chiziterem Maduka from Parsons School of Design for *Untitled Lamp*.

Honorable Mention awards were presented to the following:

- George Batska from Pratt Institute for *Dayglow*
- Zara Braun from Pratt Institute for *Billow Beacon*
- Riddhi Doshi, Aronda Alvarez Martell, and Shane Moan from New York School of Interior Design for *Glare Guard*
- Paulaine Lockward, Gabrielle Nunez, and Jiun Lee from School of Visual Arts for *The Iris*
- Estefania Martinez from Pratt Institute for *Synthetic Glimmer.*

The IESNYC announced that the 2026 edition of the Student Lighting Competition will focus on the theme "Everything Old is New Again." For more information, visit *https://iesnyc.org/Student_Competition*.

First Place: *Soluna*



Second Place: *Harbor Glow*

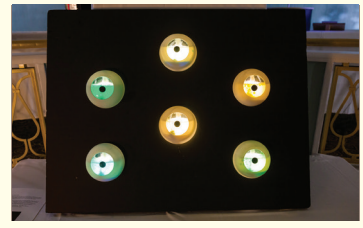
Third Place: *Untitled Lamp*

Photos: Dany Bristoll Photo

Dayglow

Glare Guard

Synthetic Glimmer



The Iris

Billow Beacon

In Memoriam

John R. Harpest, IES Member

John R. Harpest passed away in March 2025. Harpest was a project manager and lighting designer who worked on many projects around the country. As a 45-year IES Member, he served on the IES International Board and, as a Member of the IES Illumination Awards Committee, had the honor of judging lighting projects from around the world. Being a dedicated electrical engineer at heart, Harpest retired twice and, in his final months, served Wright State University as a project manager.

LD+A was well represented at LEDucation in New York City in March. Thank you to all who stopped by to say hello and offer thoughts about both the magazine and lighting industry.

MEMBER MENTIONS

Allisia Sunbury has joined **SmithGroup** as a lighting designer.

Travis Howell has been promoted to product manager at H.E. Williams.

Benjamin Salzman has joined the lighting specification sales team at ERW Lighting + Controls.

Claudia Barrett has joined **HLB Lighting Design** as a designer.

Spencer Pidgeon has been promoted to national business development manager at **Cooper Lighting Solutions**.

Bold = Individual or Sustaining Member

PRODUCTS

1.

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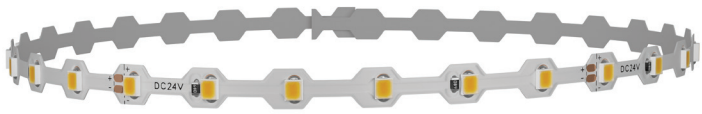

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1. Lutron introduces Sunnata keypads to the Athena commercial control system. The retrofit-ready wireless and touch-sensitive dimmer, switch, fan control, keypad, and hybrid keypad offer designers greater flexibility, programmable scene control, and scalable solutions for single-room applications and/or full-building automation. With a soft-glow LED lightbar for enhanced visibility in low-light settings, pads are available in 2-, 3-, and 4-button layouts in four gloss and 20 satin finishes.
www.lutron.com

2. Tivoli debuts 3-D Dual Bend Tape for horizontal and vertical illumination in urban extrusion designs. Available in seven color temperatures ranging from 1800K to 5000K, tape lights operate at 24-VDC and deliver up to 500 lumens per ft while consuming 4.4 watts. Tape lights have a maximum run of 20 ft and function in temperatures ranging from -40 to 140 deg Fahrenheit.
https://tivolilighting.com

3. B-K Lighting + TEKA ILLUMINATION expands the Yukon family with the Mini Yukon Bollard. Designed with commercial projects in mind, the free-standing luminaires are available in four height options ranging from 12 to 24 in. and deliver 500 lumens with an 8-W output.
www.bklighting.com

4. Gigahertz-Optik announces the VL-3708 Class L Detector for improved illuminance measurements. The detector is specified as quality class L DIN-5032 part 7 and class A DIN-5032 part 7, which differentiates it from the VL-3701 photopic detector, and can be used in combination with any of the brand's filter radiometers/photometers and amplifiers.
www.gigahertz-optik.com

5. LEDtronics introduces the FL1M-8FW Series of LED Metal Panel Indicators for direct incandescent replacement. Offered in Super Red and Aqua Green colors, flat-lens lamps with mounting diameters of 8 millimeters and IP65-rated enclosures

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are ideal for replacing outdated technology in industrial controls and panels. The durable LEDs have solid-state designs that make the lamps impervious to electrical and mechanical shock, vibration, frequent switching, and environmental extremes while consuming less than 1 watt. *www.ledtronics.com*

6. Lambert & Fils unveils Bolda, designed by South Korean designer Kwangho Lee. With sheets of polished aluminum, enameled copper plates, and a luminous tube beneath metal folds, fixtures have a sculptural quality that is in "constant dialogue" with surrounding spaces. Illumination radiates through circular perforations while accenting edges and junctions. Bolda is available as a suspended pendant (pictured) as well as two types of wall sconces; fixtures can also be streamlined for minimalist, all-aluminum options.
https://lambertetfils.com

SPOTLIGHT Coronet

Coronet announces the Lalina family of field-curvable and cuttable lighting systems for refined hospitality, office, and retail applications. With mud-in installations, Lalina Cove (pictured top) provides soft, indirect light for ceilings while Lalina Perimeter (pictured bottom) provides seamless ambient lighting for wall applications. Both systems can be customized in length, light output, and color temperature.
https://coronetled.com

PRODUCTS

7. Designer **Davide Groppi** unveils UTOPIA, an exploration of the minimum dimensions necessary for essential lighting. Made with 3-millimeter-thick LED strips in stainless steel profiles in either 6 or 12 meters long (~19 or 39 ft), these luminaires, which can be "bent in space" via a special accessory, are ideal in both high- and low-ceiling installations.
www.davidegroppi.com

8. Focal Point introduces Polina, an acoustic luminaire. Available as lit and unlit wall sconces and pendants (pictured), both in two sizes (27- and 42-in. diameters), Polina makes a visual impact with soft hexagonal shapes that can stand alone or be clustered together in larger spaces. With patent-pending TriCore acoustic construction for superior sound absorption, fixtures deliver between 500 and 2,850 lumens.
www.focalpointlights.com

9. U.S. Architectural Lighting introduces Baseline for pickleball and tennis court illumination. Designed with a Type IV CL precision optic to meet IES, U.S. Pickleball, and USTA Standard Performance Criteria for court photometrics, low-profile fixtures flood courts with glare-free, uniform light. Luminaires are BABA- and Dark Sky-compliant with a UO BUG rating for specific configurations.
www.usaltg.com

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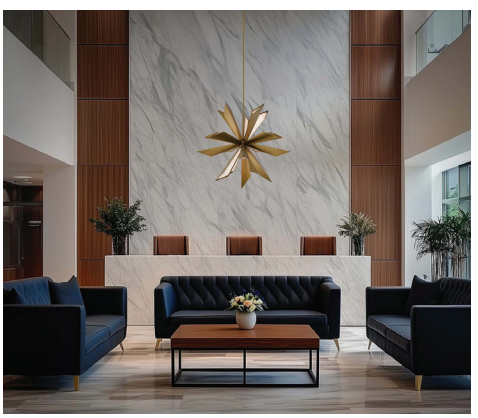
10. Optique Lighting announces the Millwork Series of recessed and surface-mounted fixtures designed to blend into woodwork and millwork applications. Powered with the brand's Nano Neon ultra-thin profile light engine, fixtures are available in 90-, 60-, 45-deg, and up/down mounting angles for design flexibility and include a factory pre-wired end piece for easy installation.
www.optique-lighting.com



11.

11. Modern Forms debuts the 40-in. Siren Pendant for high-end interiors. Casting warm, 3000K illumination, luminaires with triangular bars finished in aged brass pay homage to mid-century design.
www.modernforms.com

SUSTAINING MEMBERS

The following companies have elected to support the Society as Sustaining Members, which allows the IES to fund programs that benefit all segments of membership and pursue new endeavors, including education projects, lighting research, and recommended practices.*

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*Contributor Sustaining Members are listed at *www.ies.org*.

THE IES WELCOMES THESE NEW SUSTAINING AND UNIVERSITY MEMBERS

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Whether you are a manufacturer, utility company, distributor, sales agency, engineering firm, architectural firm, or any other professional or technical business that engages with lighting, each organization can pick and choose levels of benefits and discounts for their company employees directly—and in certain cases, non-employees' partners, as well—furthering the reach to a larger group of professionals. The complete new Sustaining Membership structure (including the tax deduction levels) is listed at: **www.ies.org/membership/ies-sustaining-membership**.

Education institutions that have dedicated lighting programs as well as those higher learning institutions that focus on "lighting" in their curriculums qualify for the University Membership. For more information on program benefits go to: **www.ies.org/membership/ies-university-membership**.

AD INDEX

The companies listed below would like to tell you more about their products and services. To learn more, access the websites listed here.

COMPANY	WEBSITE	PAGE #
Acclaim Lighting	www.acclaimlighting.com	57
ALUZ Lighting	www.ALUZ.lighting	2
Elemental LED	www.elementalled.com	1
Insight Lighting	www.insightlighting.com	7
Landscape Forms, Inc.	www.landscapeforms.com	5
Meteor Illumination Technologies, Inc.	www.meteor-lighting.com	Cover 4
Quanta Light	www.quantalight.com	49
SPI Lighting, Inc.	www.spilighting.com	Cover 2
TNT Industries US, Inc.	www.tntind.us	15

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CLASSIFIEDS

Site-responsive inflatable art comes to life in the form of characters like Yogi (pictured) and Forest Dancer created by Melbourne-based art and tech studio ENESS. As guests approach multiple larger-than-life characters adorned with motion sensors and color-changing LEDs, in the world-traveling exhibit "Modern Guro and the Path to Artificial Happiness," they are greeted with "AI-generated wisdom" that raises questions about modern spirituality, technology, and happiness.

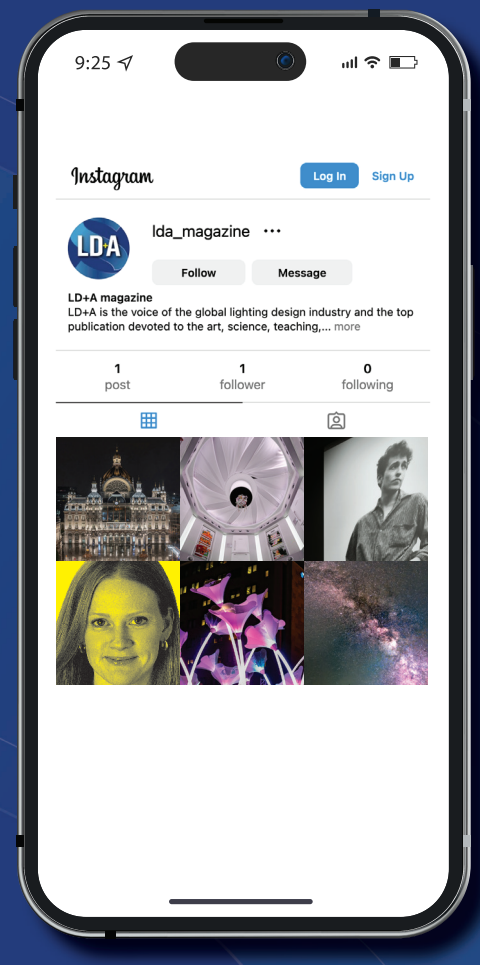
Photo: David Zanardi

LAST LOOK

Hot AI Balloons

Introducing LD+A on Instagram!

Follow @lda_magazine for the latest updates, behind-the-scenes content, and insights into the world of lighting design and application. Whether you're a **professional in the industry** or simply passionate about innovative lighting solutions, our Instagram account is the perfect place to stay inspired and informed.



What to Expect:

- Stunning project showcases
- Expert tips and tutorials
- Industry news and trends
- Exclusive sneak peeks

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