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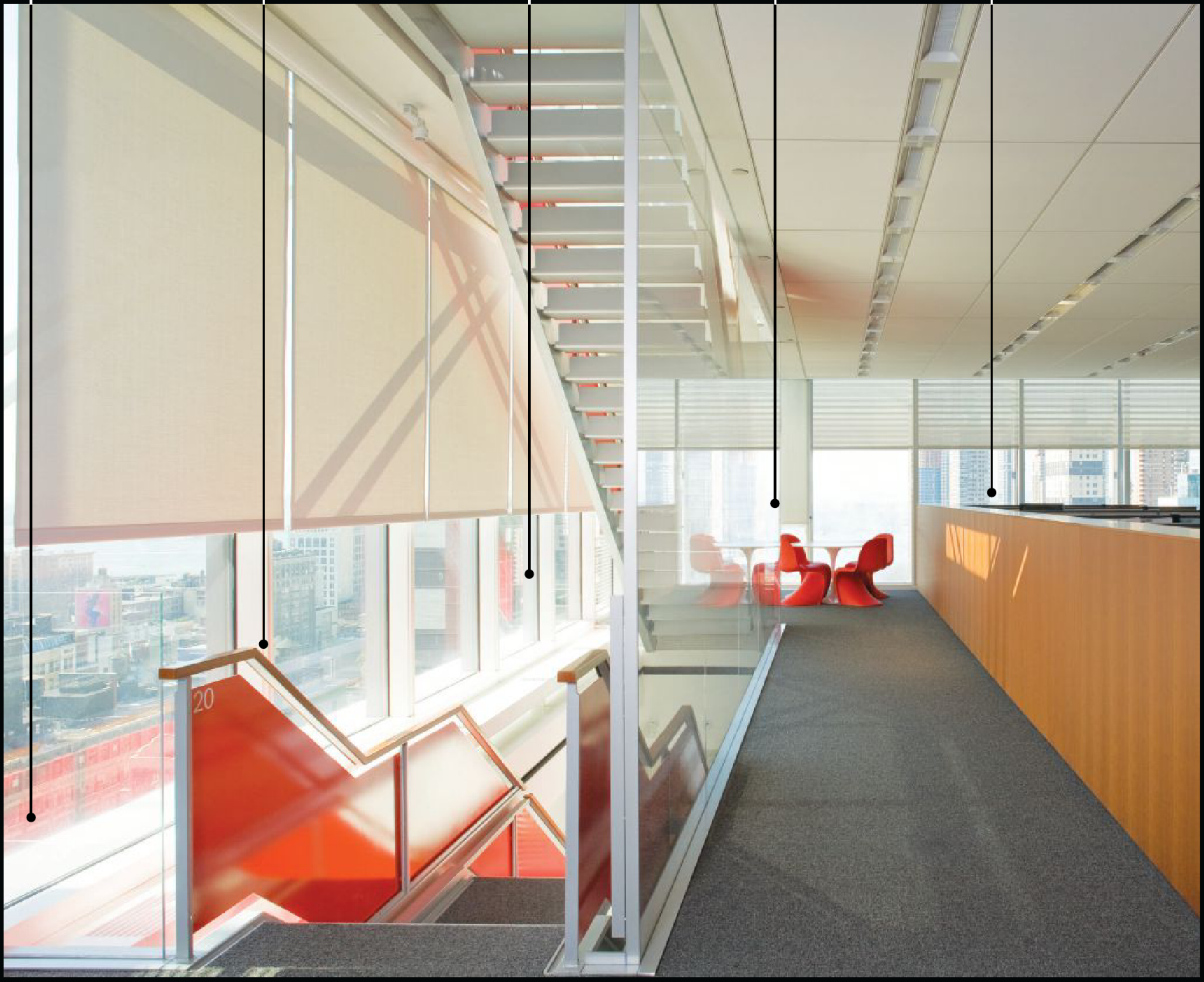

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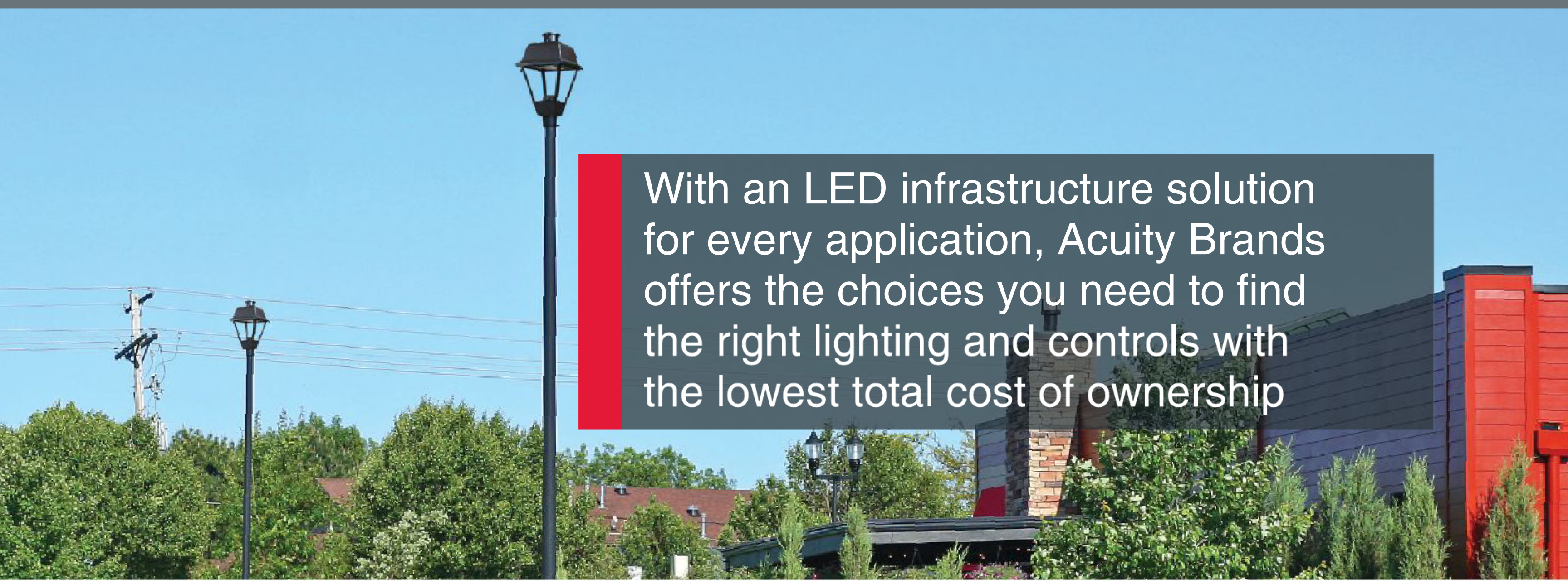

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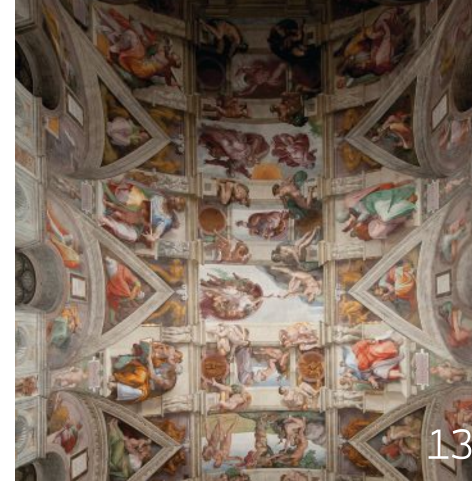

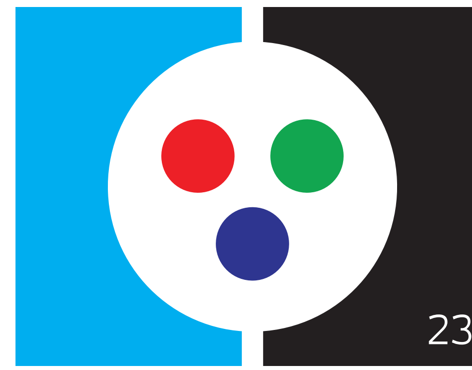

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ARCHLIGHTING.COM As always, check our website for expanded article content, videos, and news. On the site, you can subscribe to our email newsletter, AL Notes, and find a link to ARCHITECTURAL LIGHTING's digital edition.

On the Cover:
The Steven L. Anderson Design Center at Vol Walker Hall at the University of Arkansas in Fayetteville, Ark., designed by Marlon Blackwell Architects with lighting design by Renfro Design Group. Photo by Timothy Hursley.

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Left: Robert James Bova; Top right: Giampaolo Capone


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PRESERVING LIGHTING'S PAST

My heart sank when I saw the tweet on Oct. 18. A design journalist I follow on Twitter was lamenting the closing of the Whitney Museum of American Art's Marcel Breuer–designed building on Madison Avenue and East 75th Street in New York. (The museum is relocating and reopening in a new venue downtown along the High Line this spring.) I realized then that I had missed the opportunity to get to the building and take in its wonderful architectural spaces and details, and of course, its lighting.

This pit-in-my-stomach feeling reminded me that there have been all too many examples of modernist buildings and interiors threatened by either the wrecking ball or serious mutation of late. Some examples that come to mind are Bertrand Goldberg's Prentice Women's Hospital in Chicago, the removal of the Picasso tapestry at Mies's Seagram building in New York, and most recently, and also in New York, the Frick Collection's plan to demolish its Russell Page–designed side garden and build an addition in its place.

But the realization that the Breuer building is now closed hit home particularly hard because of the potential loss of its fantastically illuminated lobby ceiling. Even though the Metropolitan Museum of Art will annex the building for exhibitions and education programs for the next eight years, the building has not obtained landmark status, and there is no guarantee that it is safe from future modifications. This is why I firmly believe that architectural lighting needs its own equivalent of the American Institute of Architects' Twenty-Five Year Award. Although the award doesn't confer actual legal protection, it does convey a building's cultural significance. Without something similar, our lighting design heritage is at risk.

The Twenty-Five Year Award, which was started in 1969, recognizes "architectural design of enduring significance, [and] is conferred on a project that has stood the test of time for 25 to 35 years. The project must have been designed by an architect licensed in the United States at the time of the project's completion." Other criteria used for the award require it to be "standing" and "in good condition," as well as still performing its original program.

Modernism can be divisive. With the Whitney, this is especially true, as Brutalism can be difficult for many to appreciate. Personally, I love the Breuer building. Its material palette of wood and stone is so rich and complex. The the handrail design with its wooden cap that receives one's hand so perfectly, is one of the all-time great architectural details. I purposely made a point of running over to 75th Street when I was in New York at the end of October. Seeing the Whitney again, even if only from the outside, made me feel slightly better.

What I really wanted to see was that lobby ceiling, which Breuer designed with the assistance of Edison Price. It's a signature feature of the space—a field of fixtures with shallow disc reflectors housing half-silvered lamps. It creates a rich visual that many have tried to emulate. An architectural lighting design moment such as this is important for a number of reasons, not the least of which is that it represents a particular design thinking and execution with the lighting technology of the time. Today, such a solution might not even be considered because of available source options and energy code requirements.

If we don't work to preserve such seminal examples of lighting design, the next generation of lighting designers and the public will both loose out on a rich history. Ergo the idea of starting a lighting version of the AIA's Twenty-Five Year Award. How would it be administered? The IALD, in my mind, is the perfect candidate for the job. A lighting Twenty-Five Year Award could easily be incorporated into their existing awards program. The IALD didn't start giving awards until 1983, and a Twenty-Five Year Award would start to fill in the recognition gap of projects completed beforehand.

There's been a lot of discussion the past several years about ways that architectural lighting design can distinguish itself as a profession. The credentialing discussion is one step, but central to any profession is the documentation of its own body of work. Lighting needs to start celebrating and preserving its past. If we don't take our own design legacy seriously, then why should anyone else?

Elizabeth Donoff, Editor-in-Chief
edonoff@hanleywood.com

·BRIEFS

SWING TIME

Boston-based Höweler + Yoon Architecture is the creative force behind the design of "Swing Time," 20 LED-illuminated swings that have been installed as part of a temporary interactive park set up in the city's Innovation District along the South Boston waterfront. The swings change color as they move. Read the full article online at *archlighting.com*.

IALD NAMES THREE 2014 FELLOWS

text by Elizabeth Donoff

The International Association of Lighting Designers (IALD) has named three new members to its College of Fellows: lighting designers Claude R. Engle III, Dawn Hollingsworth, and Kaoru Mende. The announcement was made during the annual IALD Enlighten Americas conference, held this year on Oct. 16–18 in San Diego, Calif. •

Read the full article online at *bit.ly/1tRCoKv*.

CLAUDE R. ENGLE III opened his own practice dedicated to lighting design, Claude R. Engle Lighting Consultancy, in 1968 in the Washington, D.C., area. Over the course of his 50-plus-year career, Engle has received a number of lighting industry awards. He is a founding and charter member of the IALD.

DAWN HOLLINGSWORTH has worked for a number of firms where she has held management positions. She is presently lighting group manager and principal lighting designer at Stantec. She is committed to lighting education and is a past IALD Education Trust president and treasurer.

KAORU MENDE opened his office, Lighting Planners Associates, in 1990. He is the recipient of many awards, including the IALD's Radiance Award for Excellence in Lighting Design, the association's highest honor. He serves on the IALD board of directors, and in 2009 he co-founded IALD Japan.

Top: Courtesy Höweler + Yoon Architecture

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IN FOCUS

THE SISTINE CHAPEL

An LED lighting system breathes new life into the work of Michelangelo in this revered artistic and religious space.

text by Ingrid D. Rowland

photos by Governatorato dello Stato della Città del Vaticano—Direzione dei Musei

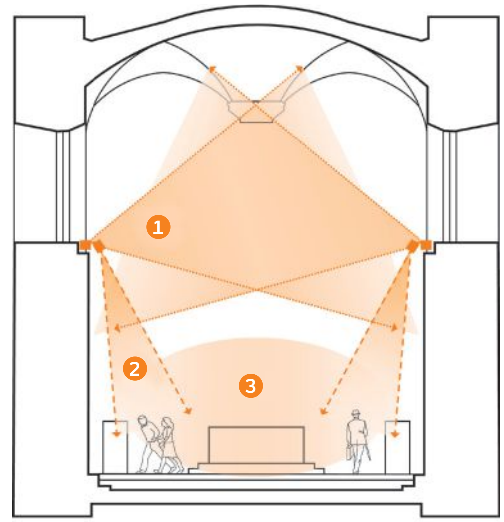
Four hundred and fifty years ago, Michelangelo Buonarroti died at the age of 89, just after putting the finishing touches on two frescoes for the Pauline chapel in the Vatican, only a few doors away from another Vatican chapel where he had triumphed at the beginning of his career. Today, rather than celebrate the anniversary with an exhibition, the Vatican Museums, under director Antonio Paolucci, decided to honor the great artist in a different way: by installing new lighting and air conditioning systems for the Sistine Chapel, ensuring Michelangelo's masterwork a long and healthy future.

After a massive campaign to clean and restore the Sistine frescoes that lasted from 1981 to 1994, Paolucci is adamant that the chapel should never undergo so drastic a treatment again. The paintings must be protected from future damage as aggressively as possible, which means minimizing exposure both to drastic changes of temperature and to pollutants. To bring about this novel celebration, the museums contacted the firms that had handled lighting and ventilation since the completion of the Sistine Chapel ceiling restoration in 1986: Osram and Carrier, respectively, who worked with the Vatican's Department of Technical Services, under the guidance of Pier Carlo Cuscianna and Rafael García de la Serrana Villalobos with Roberto Mignucci, and in the Vatican Museums by the Conservator's Office of Vittoria Cimino and the Diagnostic Library for Conservation and Restoration of Ulderico Santamaria with Fabio Morresi. Given the prestige of this assignment, these renovations have been presented to the Vatican (and to the world) as gifts.

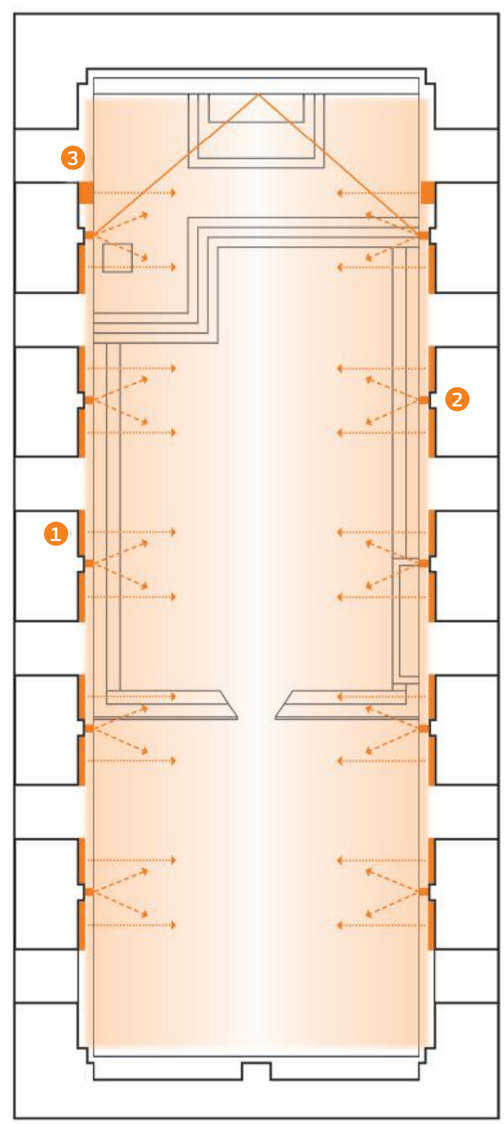
For hundreds of years, the chapel and its frescoes were lit by the 12 windows high on the walls and by an endless array of candles, whose smoke coated the delicately painted plaster with layer on layer of oily soot mingled with dust and other pollutants from the streets of Rome. After the restoration of the ceiling in 1986, these windows were permanently closed and fitted with special plastic screens to filter out incoming ultraviolet sunlight. Eight 150W high-intensity discharge metal halide lamps with quartz technology (HQI) spotlights and two 1,000W halogen projectors were installed on the outside of each of the windows. The pure primary colors of the 15th-century wall frescoes and the stunning pastels of Michelangelo's ceiling were spellbinding even with this subdued level of illumination. At the same time, a new system for air filtration and partial air conditioning was installed.

The brilliant new colors of the Sistine Chapel and the continuing development of mass tourism in the years since the restoration began to present the Vatican Museums with a new challenge: what to do with the overwhelming number of visitors, each one a living source of carbon dioxide, moisture, and dust. Annual visitors before the 1980's numbered about a million; immediately afterwards, that number had tripled. Today, more than six million people troop through the Sistine Chapel in any given year, sometimes at a rate of 20,000 in a single day. In addition, the chapel is where the College of Cardinals sits to elect a new pope, and has

Section



Plan



1. General gallery lighting for the frescoes, walls, and ceiling.
2. Gala lighting for special events and ceremonies.
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A side-by-side detail of the Sistine Chapel's frescoes prior to the lighting refurbishment and illuminated with the new custom LED lighting system (top). A view of the Sistine Chapel (above). Pope Julius II commissioned Michelangelo to paint the ceiling, and the work took place from 1508 to 1512.

ever since the late 15th century. Paolucci does not see a constructive way to limit admission, so he resolved to concentrate his efforts as director on controlling the conditions within the chapel itself.

When it came to the new lighting, Paolucci expressed his hopes for "an illumination that was gentle and at the same time total, non-invasive, respectful of the Sistine's [complexity]. Not a privileged spotlight on Michelangelo, but the possibility of a quiet, objective, and delicate reading of … 'the world's chapel.'"

For three years, Osram experts and Vatican personnel studied the chapel's particular conditions before deploying more than 7,000 carefully calibrated LEDs to create an impressively intense, even light across every surface of the famous chapel. The luminaires are similar to those that the company developed for the reopened Lenbachhaus art museum in Munich with red, green, blue, warm white, and cool white LEDs. The five color channels can be independently controlled to allow fine adjustment of the color temperature between 3000K and 4000K.

As a result, the permanent late-afternoon feeling of the old Sistine Chapel has turned into a uniformly clear light that permits close reading of the paintings in every detail. It is not a natural light as it leaves nothing in shadow, but it is an appropriate light to shed on a monument that has become an object of intense scrutiny by pilgrims, scholars, students, and cardinals, in addition to the hosts of ordinary tourists. Gilt details shine forth from the side walls and glitter from the ceiling; the background landscapes on the side walls snap into a perspective as startling as that of Michelangelo's fantastic painted architecture on the ceiling. The faces of Hebrew patriarchs, ancient Sibyls, and two future popes can be appreciated with a crisp new precision. Michelangelo's glorious colors, surely ground and mixed in sunlight, show forth in all their complexity.

The chapel's architecture provides an excellent platform for the primary luminaires: a projecting ornamental cornice that runs along the two side walls at a height of about 10 meters (33 feet) and is large enough for a person to walk along it. Michelangelo anchored his scaffolding here when he painted the ceiling, and so did the restorers who cleaned his work in the 1980s. Now the luminaires that provide the chapel with its chief source of illumination run along its length, casting their clear, even light on the frescoes above. Forty fixtures, 20 on each side, are mounted in groups of four, each with a total of 140 red, green, blue, and white high-performance LEDs. The fixtures' reflectors

are configured to guarantee homogeneous, glare-free 3500K illumination that reaches precisely up to the upper edge of the painted curtains (originally covered by real tapestries) that adorn the lower third of the chapel interior. Each luminaire is about 80mm (3 inches) wide and with a heat sink of only about 100mm (4 inches) in depth.

The new, custom-configured lighting system is set to operate with three scenes. The first is "Normal," the primary setting for illuminating the frescoes, ceilings, and walls. The second is "Gala," which is used for special ceremonies and events such as Conclave when the general light level of the luminaires is increased to a brilliant intensity and 10 LED fixtures are turned on, each with three 50W LEDs spotlights, which are spaced along the length of the cornice, five to a side. Normally these are hidden by the cornice, but when put into use they pivot downward to shed their light on papal ballots and banqueting tables below. Finally, a third preset, which incorporates high CRI luminaires, is used when the fresco of "The Last Judgment," at the far end of the chapel, requires special lighting.

Even at this level of illumination, power consumption is a fraction of what it was under the old system: 7.5 kilowatts rather than 66, and the significantly cooler temperatures of the LEDs will expose plaster and pigment to much less stress than the hot, intense light produced by the previous fixtures.

In effect, then, the new lighting system is a restoration project in its own right, designed to lengthen the life of these magnificent frescoes and at the same time to reveal them in their full glory. Michelangelo would surely have approved. •

Ingrid D. Rowland teaches at the University of Notre Dame School of Architecture's Rome program. She writes and lectures on Classical Antiquity, the Renaissance, and the Age of the Baroque for general as well as specialist readers.

During the course of the lighting assessment, the project team and technical consultants evaluated a range of different color temperatures for the new lighting system as they sought to find the right mix of illumination that would be mindful of conservation requirements but also showcase the depth and vibrancy of pigments in Michaelangelo's work (above). A color temperature of 3400K was also tested (see page 13).

Details

Project: Relighting of the Sistine Chapel, The Vatican, Vatican City, Rome • **Client:** The Vatican Museums, The Vatican, Vatican City, Rome • **Consultants:** Department of Technical Services, the Conservator's Office, and the Diagnostic Library for Conservation and Restoration of Ulderico Santamaria, all part of the Vatican Museums; Pannonian University, Veszprém, Hungary; the Institut de Recerca en Energia de Catalunya, Barcelona, Spain; Faber Technica, Rome • **Project Coordinator and Manufacturer:** Osram • **Funding:** The project, referred to as LED4Art, was supported by the European Funding Program for Information and Communication Technology within the Competitiveness and Innovation Framework Programme • **Images and drawings:** Courtesy Osram

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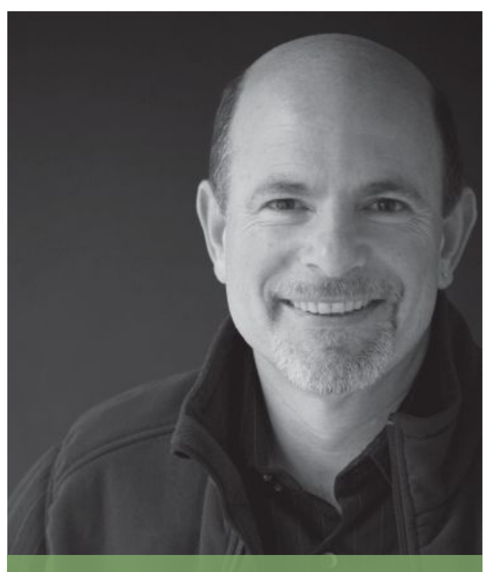
Jeffrey Milham, president of the Nuckolls Fund for Lighting Education, and Steven Rosen, president of the IALD Education Trust offer their views on lighting education.

interviews by Elizabeth Donoff

• JEFFREY MILHAM



• STEVEN ROSEN

Left: Adam Tetzloff; Right: Courtesy Steven Rosen

Two organizations have served as the primary grant and funding entities for lighting education in North America for the past several decades: The Nuckolls Fund for Lighting Education, which was established in 1988 and named for lighting educator Jim Nuckolls who established the lighting design program at Parsons The New School for Design, and the International Association of Lighting Designers' (IALD) Education Trust, which was established in 1999.

Given the unique role that each plays in the lighting community, these two organizations have been asked to do much when it comes to providing significant funding resources for students and educators. But with a limited list of resources that serve the lighting community as whole, has the lighting community taken the organizations for granted? ARCHITECTURAL LIGHTING spoke with the current presidents of each organization, Jeffrey Milham of the Nuckolls Fund for Lighting Education and Steven Rosen of the IALD Education Trust, for their thoughts on the state of lighting education and the specific roles their two organizations play.

When the Fund and the Trust were established, respectively, was there anything like either in the lighting industry in terms of a granting and scholarship outlet?

● **JEFF MILHAM:** The Besal Fund at the Illuminating Engineering Society (IES) was already established when we began the Nuckolls Fund for Lighting Education in 1989, but it was administered in a completely different way. It was for student scholarships at specific schools chosen by the Besal Fund, which was underwritten by a single lighting manufacturer—Acuity Brands. The Nuckolls Fund wanted to promote better lighting design education by supporting the schools teaching lighting. We did that primarily by putting out RFPs and asking for grant proposals, which we funded if we felt they had merit. Our first grant in 1989 was $5,000 to Penn State University, but over the past 26 years, we have given a total of $895,000 to support lighting education.

● **STEVEN ROSEN:** The Trust was established in 1999, when, to our knowledge, there were no granting institutions specifically looking to sponsor students of architectural lighting design; this was the main inspiration for starting the fund. In 2000, the IALD Awards dinner at Lightfair became a fundraiser for the Trust. That dinner has become the mainstay of Trust revenue and growth. The success of the Trust is due to the combined efforts of the volunteers (designers and other lighting industry professionals) and staff. Then there is the generosity of the lighting industry supporters who purchase tables for the dinner.

Q+A

Are the Fund and the Trust where you want them to be after all these years?
● **MILHAM:** There is always room for growth and improvement. We'd like to support more lighting education programs but are limited by how much we can give out on an annual basis.

● **ROSEN:** Our work is never done. The Trust focuses on four pillars or areas: Students, Educators, Academic Institutions, and Fundraising. As the IALD continues to build both an appreciation of architectural lighting design and support of the lighting design community worldwide, so too must the Trust do more to encourage and build an awareness of lighting design education on an international level. We currently support many constituents but the demand continues to outpace our resources. We look to an ever-growing roster of individuals and corporations to embrace and financially support what we do.

What are some of the challenges in keeping the Fund and the Trust going?
● **MILHAM:** Our greatest challenge is financial. We have been so fortunate in having people serve on the Nuckolls Fund's board of directors who have dedicated themselves to our grant and awards programs with absolutely no benefit to themselves. Many have served term after term and I can only say how fortunate the Fund has been to have had that ongoing support.

● **ROSEN:** Money. It takes a lot of energy on the part of IALD and Lighting Industry Resource Council (LIRC) members, the Trust board, and our staff to continue the funding process year after year. And we are always looking for new ways to build our coffers: from encouraging people to shop through the IALD Trust portal of AmazonSmile, to buying a blue ribbon at industry events, to encouraging manufacturers to support our teaching tools program, etc.

My predecessor—the late, great Ron Naus—was leading a plan-of-work effort to be more creative about ways to increase our funding sources. We hope to continue to honor his commitment and his memory.

Any new plans for creating more outreach?
● **MILHAM:** Last year, we completed an overhaul of the Nuckolls Fund's website and created an Educational Resources section. It contains eight separate teaching modules (nuckollsfund.org/teaching-modules) that can be used by anyone interested in lighting design education. This year, we are developing an electronic database of lighting educators with whom we can communicate and thus encourage them to use the educational resources we offer on our website. The Nuckolls Fund initiated this effort, but it has become a joint effort where we are trying to coordinate with the IALD Education Trust and the IES Education Committee.

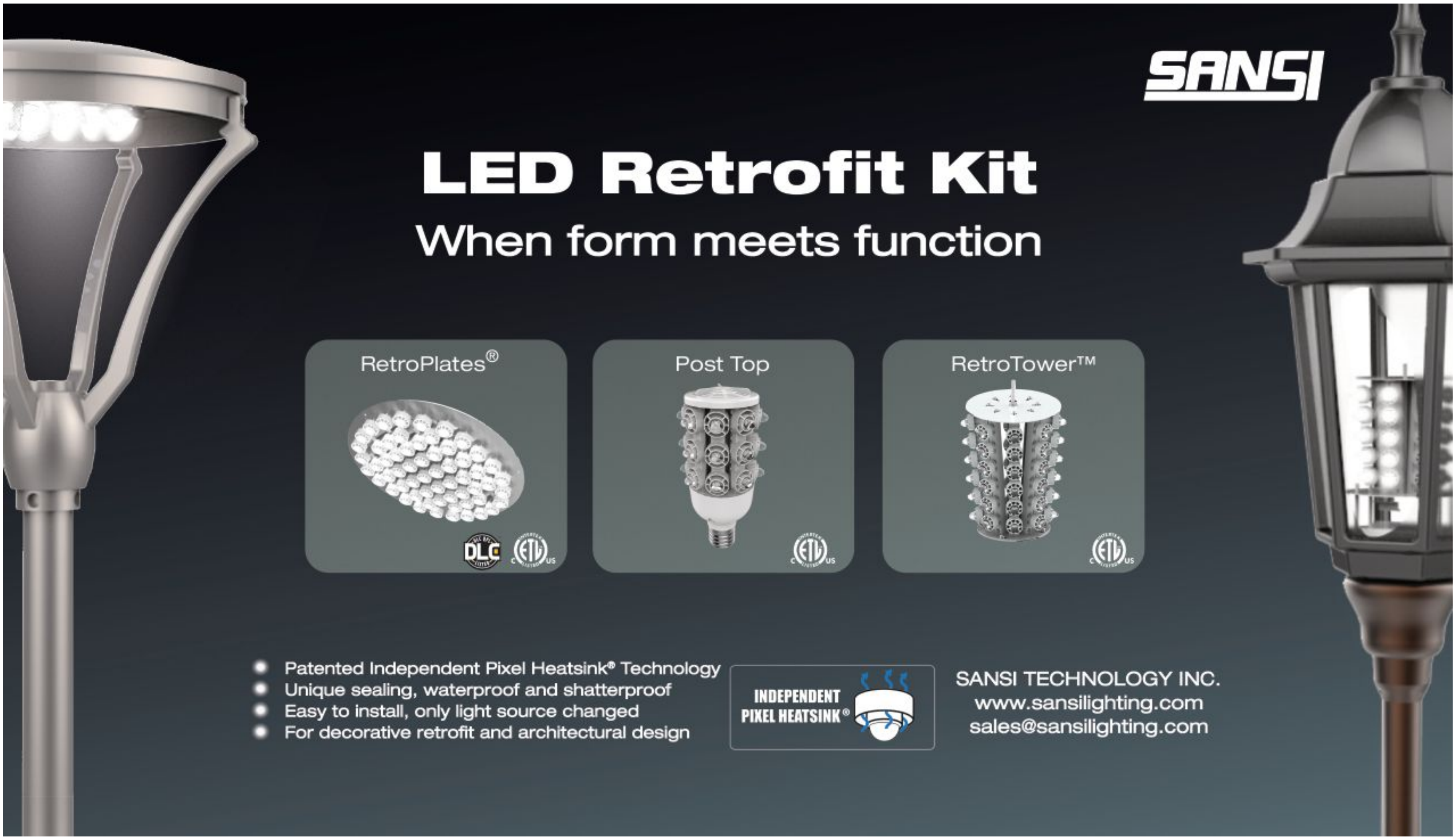
● **ROSEN:** The growth of IALD presence worldwide means the Trust will also be looking to forge new and stronger alliances and programs.

Do there need to be more granting/scholarship organizations in the lighting industry?
● **MILHAM:** There is always room for more support of lighting design education. The Nuckolls Fund and the IALD Education Trust have never been competitive, but rather supportive of one another. I would encourage the development of any new grant or scholarship organization. We would complement one another and thus do more for lighting design education.

● **ROSEN:** Whatever it takes to increase funding for lighting education is a step in the right direction. Certainly, different segments of the lighting industry attract different stakeholders, so having a variety of organizations seeking donations is never a bad thing.

Thoughts on the state of lighting education?
● **MILHAM:** Lighting education is not in a good place. Most universities now require faculty to have a Ph.D. in order to qualify for tenure. Since there are almost no Ph.D. programs available in lighting in the U.S., fewer and fewer schools have faculty that are qualified to teach lighting. As those who have taught lighting retire or leave academia for the private sector, we are losing some of our best lighting programs. We are in desperate need of more lighting design faculty.

● **ROSEN:** There is a lot of discussion in the international lighting community about this. There seems to be consensus that something needs to be done about lighting education, but what is needed is a bit more challenging to articulate. The IALD Trust is in the early stages of developing a needs assessment about lighting education which will go out to the lighting community. A problem is best solved by first understanding what folks are both thinking and are passionate about. •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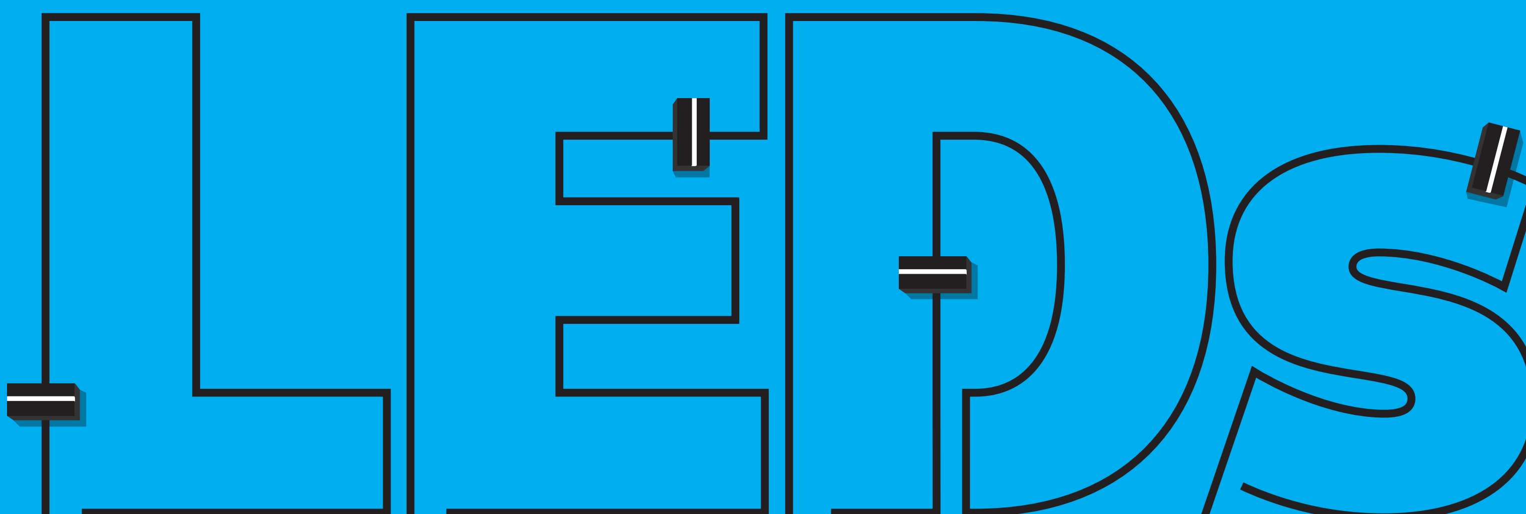


TECHNOLOGY

LEDS

TAKING CONTROL

The digital nature of solid-state lighting frees designers from wired connections.

This is the fifth article in AL's multi-part series examining the critical issues in solid-state lighting. Visit archlighting.com for the previous articles in the series, which discussed dimming, flicker, color, and optics.

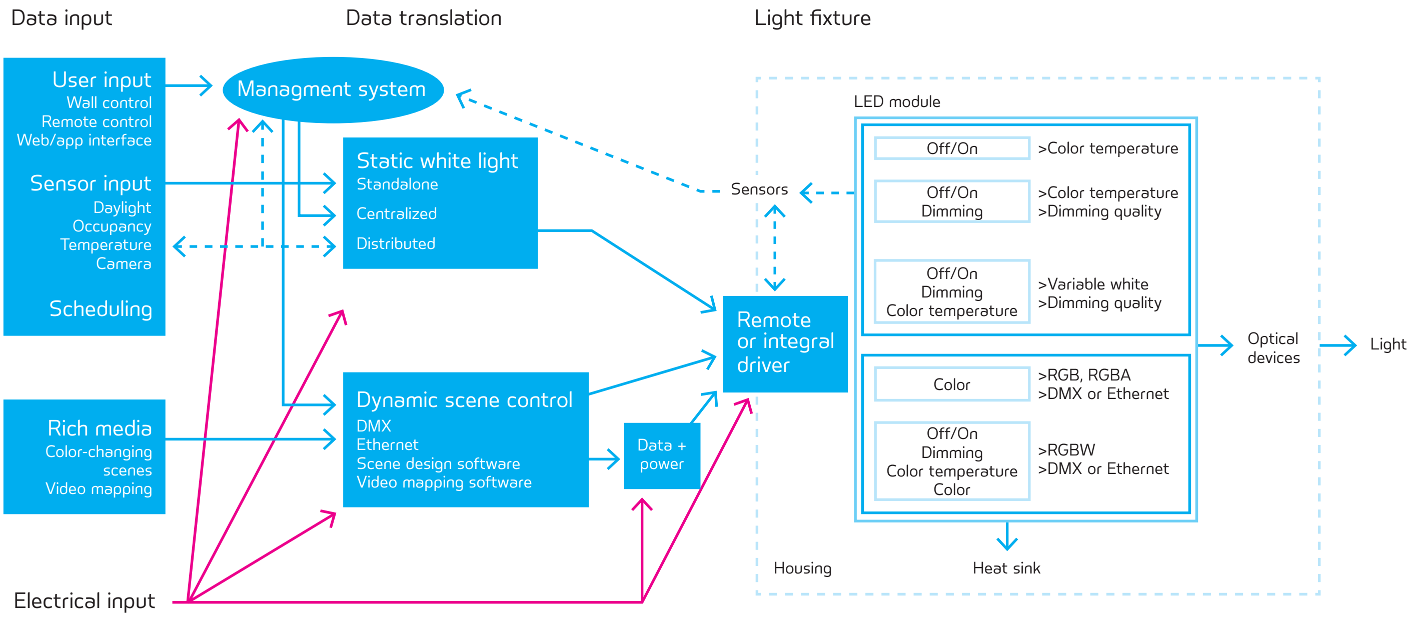
text by Dan Weissman

Amid today's golden age of digital technology, new developments in lighting control systems allow for smarter data input, conversion, and application than ever before. Until we achieve fully controllable wireless lighting, manufacturers are competing to integrate the capabilities of solid-state lighting with existing systems, protocols, and installation methods. Understanding the components of control systems, how they interact, and how to represent control concepts is key to project delivery.

Any lighting control system can be reduced to a few elements: input electricity; input data, such as an on–off signal from a switch or sensor; data-to-information converter, such as a computer chip that translates daylight sensor data into a dimming signal; information transmission through wires or wireless signals; and information output in the form of visible light from a source.

Prior to the development of digital control systems, physical wires had to be snaked from

General Lighting Control Diagram



each fixture to a centralized control center. Transformers and dimmers, which required large coils of copper housed in metal boxes with heat-dissipating fins, needed to be located in designated fireproof spaces. To provide the desired control of electric light, these systems drew an immense amount of energy and physical resources. Though contemporary systems may still incorporate elements from these legacy systems, the days of their reliance are numbered as wireless and digitally addressable systems mature.

DATA IN, INFORMATION OUT

The terms data and information are often used interchangeably, but they have distinct meanings when describing a control system: Data entering the system is processed, and the resulting information learned from the data is what controls luminaires. Although both electricity and data flow through any lighting system, this article will focus on how control systems make this data-to-information transformation possible.

Knowing when to turn on, turn off, or dim a source requires information that enters a control system as data at an input device. Any given light fixture is limited in control by the types of information it can accept. Whereas legacy sources only allowed switching or dimming, solid-state light sources allow up to four control variables, depending on the driver and LED specifications: switching, dimming, color temperature, and color.

Furthermore, nuances for each exist: Lights may dim to 10 percent, 5 percent, or 1 percent output before switching off; color may be created with RGB (red, green, blue), integrate amber for richer colors, or even include white LEDs for nicer white light distinct from color-changing capabilities. These options are available not only because the physically small nature of LEDs allows many diodes to fit within a fixture, but also because of the new capabilities of digital controls.

Today, digital systems may handle a diverse array of sensor data such as photocells and occupancy sensors, visible-light or infrared cameras, and geofencing technologies, all able to gather data from the environment. Building and energy codes, which once only acknowledged connected loads, now include requirements for automatic controls to limit electric lighting usage when not needed.

Brent Protzman, manager of energy information and analytics at Lutron, notes that ANSI/ASHRAE/IES Standard 90.1–2010, the 2012 International Energy Conservation Code, and California's 2013 Title 24 energy standards all now require occupancy sensing as well as multilevel light control and daylight controls in certain spaces, such as open offices. Sensors may be standalone pieces of hardware or integrated into the light source itself.

The digital nature of LEDs allows easy integration of onboard sensors that can speak to the driver and control the light source, or provide feedback data to a larger control system. While onboard control sensors were originally developed in fluorescent fixtures, digital protocols have allowed a much finer degree of control and flexibility, and decreased physical size of components. For example, many LED streetlights now have a computer chip programmed with scheduling data that lowers lumen output when traffic dies down after evening rush hours to save energy and prolong fixture lifetime. The chip may also talk to adjacent fixtures, creating a mesh network that feeds data back to management controls. A distributed network where each fixture has its own controls is inherently more robust than a centralized system, particularly in outdoor environments, since each fixture is an independent, self-operating entity.

Sensors integrated into LED fixtures can also provide feedback about the life and health of the

Dan Weissman

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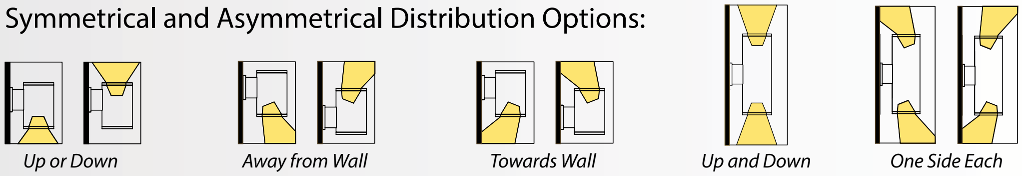

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spec hotline: 1.866.788.2100 www.waclighting.com driver and source, or serve as node points for other environmental sensors such as motion, temperature, or illumination. Retail and other commercial spaces have begun integrating location-tracking technologies, such as that by GE Lighting and ByteLight, into light fixtures. Whereas the vacuum of the A-lamp once helped us see, these digital sources now see us.

DATA CONVERSION AND TRANSMISSION

At the heart of any control system are components, devices, and software that convert complex input data signals into language that light sources understand: switching and dimming. A photocell can only report light levels; it can't decide when to dim the luminaires or when to warm the color temperature by dimming down blue diodes and turning up reds.

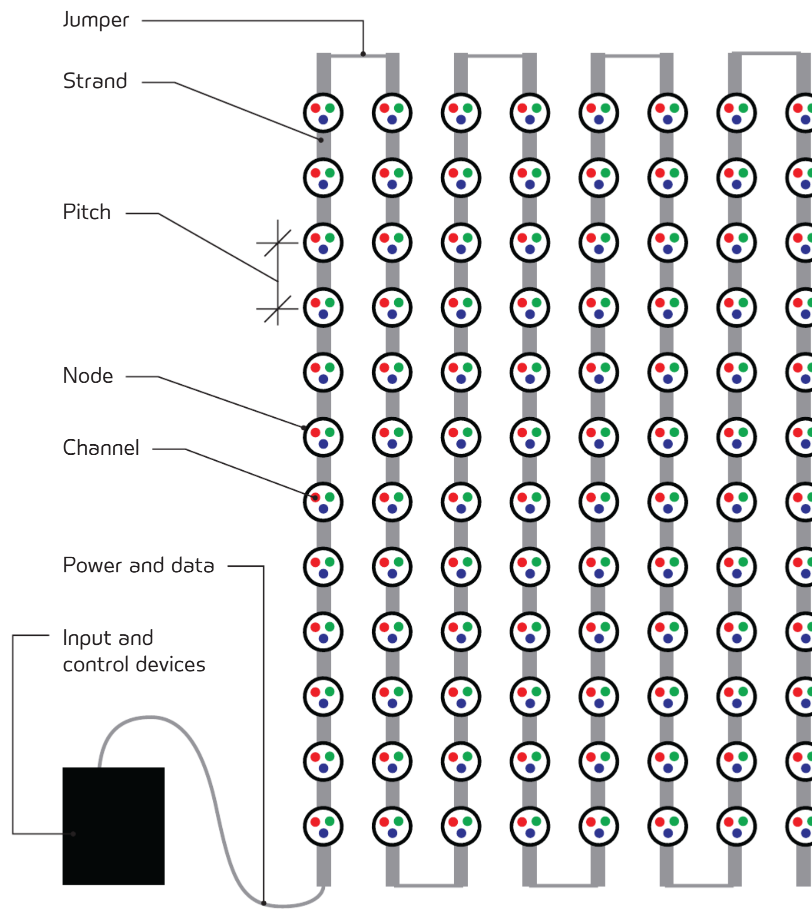
These conversion elements form the backend of a control system and comprise circuit boards, data compiler boxes, relay panels, and fixture drivers. In replacement LED lamps, data conversion may occur within accompanying mobile apps, base stations, or the lamp enclosure itself. In larger installations, centralized controls may operate over entire buildings or campuses, using any number of protocols and control hardware.

Cutting-edge building management systems from companies such as CommScope, Lutron, and Schneider Electric all include various data input options, control settings, and feedback data analysis capabilities. These systems promise a Rosetta Stone, translating data inputs from users, building sensors, light sources, HVAC, and other connected building systems into a smart learning machine that can tune the building by modifying daylighting controls or adapting schedule settings based on occupant-use patterns to minimize energy use.

Where legacy control systems require a home-run connection and command station, networked digital controls are distributed and may not require a center at all. Europe and much of the rest of the world have adopted DALI (Digital Addressable Lighting Interface) as a standardized networked protocol. The U.S. has seen far fewer DALI installations to date; instead, we rely on proprietary digital systems by manufacturers or open protocol systems.

Regardless of platform, these control systems allow fixtures to be powered from any available source, data wired in series (or controlled wirelessly), and then digitally addressed on the system after installation. Fixtures may then be zoned—or grouped with other fixtures for particular lighting presets—or configured into scenes, irrespective of installation location and wired connections, enabling spatial flexibility, local control provided to designated fixtures,

Sample Media Façade
Linear Node Strand Diagram with LEDs



A media display is an array of nodes—individual pixels that may be white light only or RGB, and include multiple diodes and accessories—that creates dynamic scenes or lighting effects. LED nodes are connected to a strand of sheathed wiring for data and power; standard pitches, or spacings between nodes, are 4 inches, 6 inches, and 12 inches. The input and control devices utilized will depend on a project's requirements and content. Applications with integrated media displays that employ a few scenes may need only a small box with self-contained control hardware, while video displays may also require an encoder and converter. The control device, which supplies power and data to the media display, will typically use the control protocol DMX, or digital multiplex that can operate 512 channels—communication lines between the control device and source—per universe. DMX technology allows jumpers to daisy-chain multiple strands of nodes together.

Dan Weissman

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11

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Above: The 2014 AL Light & Architecture Design Award recipients who were in attendance at the AL Light & Architecture Design Awards celebration on October 29 in New York City.
Back row, left to right: Joseph G. Tattoni, Ikon.5 Architects; Teal Brogden, HLB Lighting Design; Sandra Boker representing Lighteam; and Steven Rosen, Available Light
Front row, left to right: Eileen Pierce, Renfro Design Group; Richard Renfro, Renfro Design Group; Chi-Chi Lin, BIG – Bjarke Ingels Group; and Kai-Uwe Bergmann, BIG – Bjarke Ingels Group

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and assignment of pre-set levels to each fixture. Master control through a computer interface can then be accessed via any wired or mobile device on the system.

DYNAMIC LIGHTING, DYNAMIC CONTROLS

Arguably the most visible development in LED lighting is the ability to address nodes, which allows designers to create dynamic scenes in white light or color. Although some manufacturer literature uses “node” to reference the point at which data and power are combined and fed to multiple fixtures, this article uses the term to mean individual pixels in a system.

Digital multiplex (DMX), the industry standard for theatrical lighting control since the 1980s, was designed for use with a theatrical dimming board. Today, it is the most widely used data protocol, or digital lighting controls language, for dynamic architectural lighting. DMX has two units of measure: the channel and the universe. While a single channel is analogous to a single dimmable circuit in a conventional system, one universe of DMX supports 512 channels. In an RGB color-changing node, each channel represents one color of light, or three channels. A quick calculation reveals that 170 nodes of RGB (totaling 510 channels) can be controlled by one DMX universe, and large systems can contain multiple universes.

Manufacturers of architectural color-changing systems have evolved away from the theatrical board. Instead, they have developed control boxes of various sizes that receive scene data from a flash drive, computer, or Web interface and send out DMX signals to fixtures. Design and control software, often provided by the manufacturers, may be used to develop scenes from standard templates or map video input onto a grid of nodes. (But just say “no” to the default rainbow-fade setting.)

For all its ubiquity, DMX is still limited when handling large installations. Increasingly complex setups use direct Ethernet connections and computer management to populate pixels more akin to a monitor than theatrical lighting.

CONNECTING DEVICES AND PEOPLE

For the foreseeable future, electricity will continue to flow through copper wires from power sources to fixtures. However, control data can travel through many media: optical fiber, CAT 5 cable, or wireless signals. Lutron’s Protzman says his company’s wireless controls are increasingly used in commercial and retrofit applications because of the cost savings that come from the reduction in cable material and installation time.

As ambient computing and the Internet of Things find homes in our built environments, organizations such as ZigBee Alliance and EnOcean Alliance have developed alternate standards to ensure interoperability across hardware. ZigBee, according to chairman and CEO Tobin Richardson, lobbies manufacturers to develop all types of products with the Institute of Electrical and Electronics Engineers (IEEE) 802.15 standard for mesh-networking, which operates at lower power than the IEEE 802.11 standard, which Wi-Fi uses, and avoids potential conflicts with computers and mobile devices.

Meanwhile, EnOcean lobbies manufacturers, specifically in the building industry, to adopt a technology produced by its namesake German manufacturer, which transmits low-powered data signals by harvesting energy from micro-movements present in all physical objects. Regardless of protocol, electrical things in our buildings will soon talk to each other, suggesting opportunities we haven’t even imagined.

Building-scaled lighting control systems now offer many bells and whistles, and technologies across multiple manufacturers only add complexity. Communication among project stakeholders is critical to implementing robust systems that may take advantage of opportunities offered by LED technologies. However, because lighting control is no longer limited by physical wired connections, engineering wiring diagrams now do little to represent control concepts.

To that end, lighting controls diagrams developed by the lighting designer, architect, or interior designer serve to aggregate the spatial information in a wiring diagram with temporal information in a controls narrative and scene schedule. Such diagrams provide design, engineering, and construction teams, as well as the owner or facility manager, with an overview of a control system's intent, including which fixtures should operate together, when and how scenes change, and the locations of automatic and dynamic controls.

Soon enough, all building lighting will be completely wireless, fully networked, sensored, and seamlessly controllable via Web or mobile apps. In the meantime, smart integration with existing systems is critical to transitioning building projects, which will continue to require multiple types of control for various design elements throughout the building. The options are plentiful, but, in the end, most lighting control scenarios still boil down to the basic questions. When should the lights be turned on? How bright? When should they be turned off? What is their purpose? Ultimately, what we seek are integrated systems that provide the light we need at the times we need it, monitor and minimize energy use, and entertain us when the moment is right.

Dan Weissman is director of Lam Labs at Lam Partners, in Cambridge, Mass.

Dan Weissman

RESOURCES

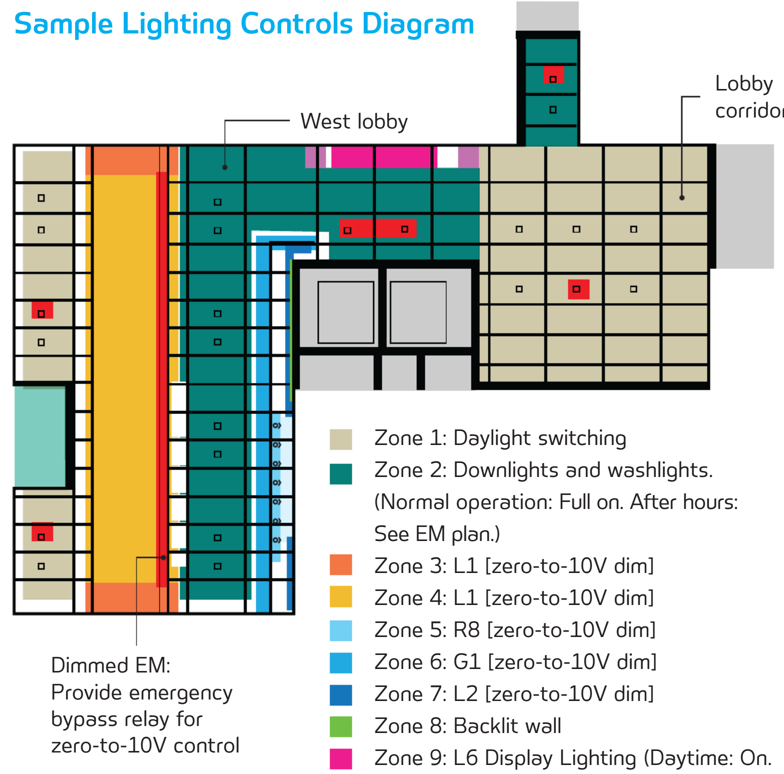
A list of introductory articles that discuss controls and their relationship to solid-state lighting.

"Controlling LEDs," by Lutron (Ethan Biery, Thomas Shearer, Roland Ledyard, Dan Perkins, Manny Feris), May 2014. Available at: *bit.ly/1kFPBlt*.

"Maximizing energy savings with control over light," by Koninklijke Philips Electronics, April 2013. Available at: *bit.ly/1oHUth6*.

LED Lighting Explained, by Jonathan Weinert, published by Philips Solid-State Lighting Solutions, 2009. Available at: *philips.to/1EyxFUL*.

Sample Lighting Controls Diagram



- Zone 1: Daylight switching
- Zone 2: Downlights and washlights. (Normal operation: Full on. After hours: See EM plan.)
- Zone 3: L1 [zero-to-10V dim]
- Zone 4: L1 [zero-to-10V dim]
- Zone 5: R8 [zero-to-10V dim]
- Zone 6: G1 [zero-to-10V dim]
- Zone 7: L2 [zero-to-10V dim]
- Zone 8: Backlit wall
- Zone 9: L6 Display Lighting (Daytime: On. After hours: Client to determine.)
- Zone 10: R5 fixtures (Normal operation: Daylight switching. After hours: On.)
- Zone 11: L3 Vertical coves
- Fixtures on emergency circuit

PRODUCTS

SLEEK AND SIMPLE CONTROLS

Behind these subtle switch plates are systems that offer smooth dimming no matter the lamp type.

text by Hallie Busta

250W C•L Dimmers, Lutron • Lutron has added a 250W option to its line of C•L dimmers suited for use in applications that feature striplights, downlights, and linear cove fixtures. The non-neutral, two-wire, forward-phase wallbox dimmer can be used with a range of LED and CFL lamps in residential applications. The 250W model is currently available as part of the company's Ariadni and Diva families of controls offerings. • *lutron.com*

xCella Wireless, Acuity Controls • Designed for a variety of applications from a single room to an entire building, the xCella Wireless switches and controls use distributed relays to create a system that communicates device-to-device without the need for a central processor or gateway. The system includes battery-free wireless switches, sensors, and load controls that are field-configurable. It can operate on its own or be implemented in a hybrid wireless–wired solution. • *lightingcontrols.com/xcellawireless*

Harmony Tru-Universal Dimmer, Legrand • The Harmony Tru-Universal Dimmer self-calibrates based on the type of lamp that the end-user installs. The dimmer works in preset, single-pole, and three-way applications and requires no derating for one- and two-gang installations. It is rated for a range of loads and lamp types, including halogen, incandescent, CFL, and eternal fluorescent lamps and electronic and magnetic low-voltage dimmers. Ivory, white, and light almond facing colors are available. • *legrand.us*

Vizia RF+ VRMX1 Universal Dimming Switch, Leviton • Leviton has updated its Vizia RF+ family of Z-Wave energy management and lighting controls with the VRMX1 universal dimmer, which offers local and remote dimming for LED, CFL, incandescent, and halogen lamps. It provides two-way feedback, can be used to create scenes, and has 49 fade rates. For single-pole and three-way applications, it uses the Zensys 4.5.4 Z-Wave protocol library. White, light almond, and ivory facings are included. • *leviton.com*

A·L ARCHITECTURAL LIGHTING 2015 PRODUCT ISSUE

CALL FOR SUBMISSIONS

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- Emergency/Exit Lighting
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Product submissions must include the following materials:

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2. Hardcopy printout of product information including product press releases and technical spec sheets that describe the product in detail. (Do not send full catalogs.)
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LEARNING LIGHT

Marlon Blackwell Architects and Renfro Design Group have designed a new home for the University of Arkansas Fay Jones School of Architecture that illuminates in more ways than one.

text by Aaron Seward
photos by Timothy Hursley

As a professor at the University of Arkansas Fay Jones School of Architecture, Marlon Blackwell knows a thing or two about teaching design. When the university, which is located in Fayetteville, Ark., asked Blackwell's local firm, Marlon Blackwell Architects, to renovate and design a new addition for Vol Walker Hall to accommodate the architecture, landscape architecture, and interior design programs all under one roof, he saw an opportunity to transform the building into a learning tool.

The existing 1935 Classical Revival style building faces east on the main axis of the campus. Blackwell's addition—the Steven L. Anderson Design Center—forms a western wing to the legacy structure. It is modern in character, composed of raw, exposed cast-in-place concrete and steel, with a west-facing glass façade shaded by a brise-soleil of north-angled, 50 percent fritted-glass fins. In the meeting of these two distinct architectural styles Blackwell laid out a variety of spaces—classroom studios, faculty offices, student and teacher lounges, gallery and review facilities, and an auditorium—each of which forms a lesson of sorts from which students can glean insights into the nature of buildings and building elements. The lighting—which Blackwell designed with University of Arkansas alumnus Richard Renfro of New York City–based Renfro Design Group—responds to this episodic succession of spaces while creating cohesiveness and a smooth transition between old and new.

"There isn't just a standard light deployed everywhere," says Blackwell. "There are a variety of lighting situations, which are part of the didactic approach to the architecture. There are lights that are hidden, lights that are exposed, some that are engaged, some that are backlighting. There are a variety of ways you can look at how to light space in a situational way. It was pretty important for the students to see that. It breaks out of the institutional mold where you have two types of lighting over a grid."

Blackwell opened up the central axis of the building with a clear, unobstructed corridor that runs straight through both old and new structures from the main entrance on the east to a new entrance on the west. This required the removal of library stacks that once occupied the rear of Vol Walker Hall. With the stacks gone, and the library relocated elsewhere on campus, a large room was created at the center of the new complex. The 36-foot-tall space, known as the Gallery, made an ideal space for conducting student reviews. To bring daylight and views of the sky into this enclosed room, Blackwell

An exterior view of the Steven L. Anderson Design Center, the new addition to the Fay Jones School of Architecture at the University of Arkansas (opening spread). In the Gallery (right), a backlit fabric ceiling is equipped with 32W T8 fixtures, which are set to different light outputs depending on how the space is being used and the time of day. This is to complement the natural light entering the space via the central skylight. A glass-enclosed egress stair creates a transparent node between the existing and new buildings (left).

incorporated a rectangular oculus into the ceiling that cuts a passage through new studio spaces that were added to the roof as part of the addition, which he calls a "rectaculus." The next issue was managing the large hall's acoustics and finding an electric lighting solution that would preserve the integrity of the Classical Revival fabric. The team found a single solution that answered both design challenges: "I'd seen Richard do this in a loft in New York. A fabric ceiling, backlit, that creates an even distribution of light, like a big lampshade," Blackwell says.

The ceiling is made from two layers of translucent, stretched Newmat, which has small perforations that give it acoustical properties. Renfro Design Group organized 32W T8 fluorescent strips 2 feet on center in a 2-foot-deep cavity behind the fabric. The fixtures are equipped with stepped ballasts that provide 30 percent, 60 percent, and 100 percent power, allowing the light level to be adjusted depending on the time of day and how the space is being used. At night, for example, the ceiling is dimmed down to the minimum output. It is only set to 100 percent during reviews, when students' projects are posted on movable boards that can be arranged in multiple configurations.

The design team followed this protocol of using indirect lighting that does not impinge on the historic architecture throughout the existing spaces. In other places, however, an indirect, discreet, modern approach was used. For example, the axial corridor running from the east entrance is lit by vitrines that are used to display student work. The vitrines are perched on legs with 32W T8 fluorescent fixtures on their tops and bottoms, which provide ambient light by uplighting the molded ceiling and downlighting the terrazzo floor. Inside the cases, asymmetric LED wallwashers at 9W-per-linear-foot light the work on display and provide additional ambient illumination in the corridor.

The corridor opens onto a space called the Commons, where there is a 28-foot-long wooden table crafted from two trees that were cut down to make way for the addition. "You can see where the roots were at the bottom, and the knots where limbs came out," Renfro says. "When you have a wood class you can see every aspect of how a tree grows, or you can just lie down on it and take a nap." Additional vitrines—here embedded in glass walls that enclose the faculty offices—provide indirect lighting, this time with the 32W T8s only uplighting the ceiling. T8s placed on the office-side of the transom mirror the lighting effect and accentuate the translucent quality of the etched glass.

From outside as well as inside the building, the transition between the old and new structures is best observed—and learned from—at the egress stairs. Encased as they are in glass, they create a transparent formal joint between the two edifices. "When you're walking down the stairs, the way they slice through corners of the old building, you can get up close and see the cornice, and see the scale of the thing," Renfro says. "It's a wonderful opportunity for design students to see how buildings go together." The lighting reinforces the verticality of the stairs: lens-concealed 32W T8 fixtures run in a continuous pocket carved up the entire four-story elevation of the stairwell's concrete wall. In the main

The corridor that runs from the east entrance is lit by a series of vitrines that are used to display student work (top left). The vitrines are illuminated with 32W T8 fluorescent fixtures. The interior of the cases house asymmetric LED wallwashers at 9W-per-linear-foot. In the 200-seat auditorium (left), the lighting is set on separately controlled layers to meet the needs of the space. The LED ceiling downlights are dimmable and shades along the corridor window wall can be drawn for projection presentations and films. In the exhibition gallery, recessed lensed 26W CFL downlights are used (above). In the studios (opposite), natural light is balanced with 32W T8 direct-indirect pendant fixtures overhead and additional tasklighting at the workplane.

circulation spaces that feed off the stairs, lines of LEDs carved into recesses in the concrete ceiling create a contrasting horizontal rhythm to the vertical thrust of the stair illumination.

In the studios themselves, Blackwell employed a raised floor to accommodate services and mechanicals in order to leave the concrete slab ceiling bare and exposed. Lines of 32W T8 direct-indirect pendant fixtures running perpendicular to the brise-soleil provide 50 footcandles of ambient lighting, while LED tasklighting incorporated into the workspaces provides another 50 footcandles. Daylighting from the glass wall is carefully balanced with electric lighting in the 50-foot-deep space by arm-mounted 32W T8 wallwashers that illuminate a pinup wall opposite the façade.

Metal halide wallwashers with 35W T6 lamps cast into the concrete ceiling highlight two concrete shear walls that run the entire elevation of the new building. This feature lighting enables the walls to telegraph their presence through the glass façade after dark, providing yet another lesson in structure. In fact, the entire western face of the building becomes a lantern on campus at night that reveals the activity going on within—and architecture students are known to work late—to passersby.

This transparency, or at least translucency, was maintained even in the new wing's auditorium space, where the brise-soleil, running across an upper gallery, allows daylight to filter in. "Back in my day, I missed [things] in my architecture history classes because they pulled the shades, it was hot, and I fell asleep," Renfro says. "This room never has to go really dark. Projectors are more powerful so they can work with some daylight coming in, and it makes a much more engaging space in which to listen to a lecture. You're always connected to out of doors."

The electric lighting scheme in the auditorium, as in the rest of the project, integrates with the architecture. Shielded dimmable 21W LED accent lights are incorporated into metal channels in the ceiling, providing flexible lighting for the seating area and accent lighting for panel discussions at the front. Linear LED fixtures, 14W-per-square-foot, in lens-covered uplight coves incorporated into the stairs are equipped with two settings: higher output white light and a lower output red light. Dimmable 50W MR16 halogen accent lights recessed in the ceiling above the podium focuses lights on speakers. And a dimmable 32W T8 fluorescent wallwasher illuminates the display wall behind the podium.

While diverse in its types and treatments of space, Vol Walker Hall and the Steven L. Anderson Design Center seem part of a cohesive statement, the glue of which is the lighting design. "We had a desire to make insertions where we wanted to make them and create our own history rather than looking over our shoulder," Blackwell says. "Somehow it all fits together." •

Details **Project:** Steven L. Anderson Design Center, addition to Vol Walker Hall at the Fay Jones School of Architecture, University of Arkansas, Fayetteville, Ark. • **Client:** University of Arkansas, Fayetteville, Ark. • **Architect:** Marlon Blackwell Architects, Fayetteville, Ark. • **Associate Architect:** Polk Stanley Wilcox Architects, Fayetteville, Ark. • **Lighting Designer:** Renfro Design Group, New York • **Structural Engineer:** Kenneth Jones & Associates, Little Rock, Ark. • **Mechanical Engineer:** TME, Fayetteville, Ark. • **Civil Engineer:** Development Consultants Inc., Little Rock, Ark. • **Landscape:** Crafton Tull Sparks, Little Rock, Ark. • **Acoustics:** Dr. Tahar Messadi • **Preservation:** John Milner Associates, West Chester, Pa. • **Geotechnical Engineer:** Grubbs Hoskyn Barton & Wyatt, Little Rock, Ark. • **Contractor:** Baldwin & Shell Construction Co., Little Rock, Ark. • **Project Size:** 90,955 square feet (34,320 square feet - new addition) • **Project Cost:** $32.4 million • **Lighting Cost:** $1.15 million • **Code Compliance:** ASHRAE 90.1-2007, LEED 2009 v.3 • **Watts per Square Foot:** 1.17 **Manufacturers** **Acuity Brands/Lithonia Lighting** (Surface-mounted 32W T8 fluorescent strip with stepped ballast at double-height gallery) • **Acuity Brands/Mark Architectural Lighting** (Recessed lensed 32W T8 fluorescent wall grazer at corridors) • **Acuity Brands/Winona** (Semi-recessed linear 32W T8 fluorescent wallwasher at classrooms) • **Bega** (Recessed louvered 13W CFL steplight at auditorium corridor) • **Eaton's Cooper Lighting/io Lighting** (Surface mounted linear 9W/LF LED wallwasher within display cases; 9W/LF LED fixture mounted within handrail at exterior stair) • **Edison Price Lighting** (Surface, pendant, recessed, and unistrut two-circuit track with halogen MR16 and LED wallwasher and accent trackheads at galleries, auditorium, and faculty lounge)• **Fawoo** (Surface-mounted 30W LED glowing panel at west entry vitrine) • **Focal Point** (Recessed, flangeless, linear-lensed 32W T8 staggered fluorescent fixture at classrooms; recessed, linear-lensed 32W T8 fluorescent fixture at south conference room; recessed 50W halogen MR16 downlights and wallwashers at south conference room) • **GE Lighting** (ConstantColor HIR 45W MR16 lamps) • **iLight** (Surface-mounted linear 3W–5W/LF LED strip at corridors, student lounge, and exterior plazas) • **Kurt Versen/Hubbell** (Recessed lensed 26W CFL downlight at exhibition gallery) • **Lumascape** (In-ground 20W T3.5 metal halide uplight at exterior façade) • **MP Lighting** (Semi-recessed 1W LED marker light at roof terrace) • **Philips** (MasterColor 20W T3.4 and 35W T6 lamps) • **Philips Color Kinetics** (Surface-mounted 14W LED grazer at auditorium stair and lounges) • **Philips Lightolier** (Recessed 21W LED downlights and wallwashers at lobby and corridors) • **Prudential** (Surface-mounted linear-lensed 32W T8 fluorescent fixture at stair niche) • **Selux** (Pendant-mounted linear-lensed 32W T8 fluorescent fixture at studios) • **The Lighting Quotient/Elliptipar** (Pendant- and surface-mounted 32W T8 fluorescent wallwasher at studios; semi-recessed lensed 35W T6 metal halide wallwasher at concrete feature walls; surface-mounted 32W T8 asymmetric uplight at Commons) • **Universal** (Stepped ballast for surface mounted 32W T8 fluorescent strip at double-height gallery)

BRIGHT

SPOT

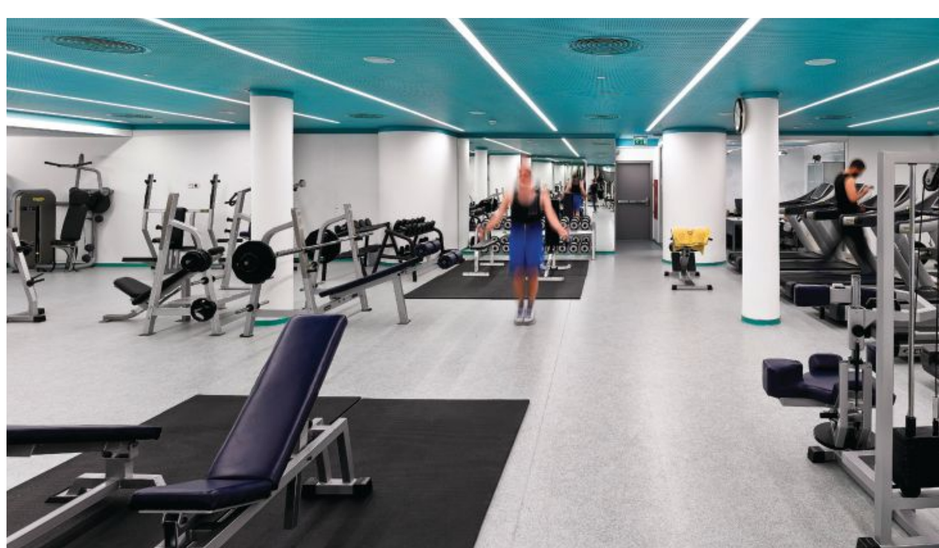
Bold color and custom lighting solutions combine to create a vibrant new gathering place for students at the Lebanese American University in Beirut.

text by Elizabeth Evitts Dickinson
photos by Robert James Bova

Several years ago, the Lebanese American University (LAU) in Beirut realized that of the more than 8,000 students enrolled at the school few spent time at its Wadad Said Khoury Student Center. And no wonder: Built in 1996, the five-story, 57,000-square-foot (5,300-square-meter) building was less than inviting. Student areas were often cramped in awkward spaces that felt more like afterthoughts than comfortable meeting venues. The worst offender was the cafeteria. Located in an older building connected to the student center, the dining hall suffered from no windows, terrible acoustics, and high ceilings. It made for an unpleasant dining experience. "The cafeteria was very old and did not have any external lighting," says Georges Hamouche, assistant vice president for facilities management at LAU. To remedy this and create a facility that students would enjoy using, the university sought to overhaul and modernize the center while also increasing business in its cafeteria by making "the dining area more appealing," Hamouche says.

Chérine Saroufim Sacy, assistant managing director and partner at Beirut's Idepconsult, (see page 43) remembers walking into the student center and cafeteria for the first time in 2012. "Architecturally speaking, it was a very awkward and dark space," says Sacy, who is both an interior architect and a lighting designer. Beirut is a bright, sunlit city, so the dark cafeteria presented a particularly jarring juxtaposition. "Coming from outside with its huge amount of daylight, it was sad to walk into this box," she says.

Lower left: Ralph Mrad



In the cafeteria, three illuminated light-wells use 2700K and 6500K T5 lamps to mimic the change in color temperature of natural light throughout the day (opening spread). In the lounge, a bold use of color and a playful arrangement of circular-shaped fixtures create a lively setting for students (above). The circular motif is continued as a frit pattern in the hallway leading to the game room (far left). In the gym, low ceiling heights dictated a linear fluorescent fixture with an opal diffuser (left).

To make the student center a vibrant hub for the LAU campus, Idepconsult had the challenge of working within the existing structural envelope and with a limited budget. The firm was more than up to the task, having been founded in Beirut in 1979 by Sacy's father, architect Mounir A. Saroufim. Sacy and her brother, architect Chadi Saroufim, joined the family business and now work closely with their parents. "We like to be hands-on for every part of a project," Sacy says of the family's approach to project management. "We take a lot of time coordinating drawings in the office," says Chadi Saroufim. "We have mechanical and electrical engineers [in-house], so all of the coordination is done in our office. We do a lot of mock-ups. We know exactly what we want and we specify clearly."

Lighting, Sacy says, is part of that control; it is always a primary component of an Idepconsult plan. "Lighting makes a huge difference because even if the design is high-end and you use the finest materials, if it's not well lit, the project fails," she says.

Budget constraints forced the designers to be creative with material selections. Every design and lighting move needed to have multiple functions. This is best illustrated in the cafeteria, where three "skylights," which are actually electrically lit, sprout from the ceiling plane, creating a dynamic visual in an otherwise monotonous interior. These structures not only bring in much-needed light and provide architectural detail, they also serve as acoustic sound breakers that dampen the noise. The lightwells use 28W T5 fluorescent lamps set on a control system to mimic the effect of sunlight throughout the day and the seasons. This evolving light also helps to subtly control the way people use the space. "The café is smaller than what is needed for the students. It's always full," Sacy says. "In the morning we want [the students] to relax, so we have lower light levels and warmer core temperatures around 2700K. At noon, we use a higher color temperature, around 6500K, so that people will be more alert, eat faster, and empty the space so that others may come in."

Another dynamic element in the cafeteria is a set of wooden fins designed to control acoustics and affixed to the wall. Surface-mounted fluorescent battens offer an additional light source and give the fins a sculptural quality.

The renovated student center, which opened in September 2013, includes the cafeteria and an adjacent coffee shop, as well as classrooms; study lounges; a gym; dance, music, and game rooms; and academic offices. The new interior is decidedly contemporary, with a bold system of bright primary colors to help with wayfinding. All circulation within the building is monochromatic—white, gray, and black—but assertive punches of red, green, and blue demarcate different rooms. "Each space has its own specific color and the lighting was designed to enhance it," Sacy says.

Sometimes these colorful elements double as the building's mechanical infrastructure. In a student study room, high ceilings are made to feel less imposing with waves of colorful, floating ceiling tile fabricated from acoustical material and designed to integrate everything from lighting to motion detectors to sprinklers.

Ceiling tile supplied inspiration in other social spaces, as well. For a game room and office area, the designers selected a gypsum board ceiling tile, pre-punched with small circles for acoustic dampening. They painted the board a matte-colored green and then picked up on those perforated holes by continuing a visible pattern of circles: Lighting fixtures are round, painted to coordinate with the ceiling color, and some have been custom-made to be oversized and dramatic. Circles again find their way onto a custom privacy film placed on the glass walls of the staff offices to delineate them from the public game room.

Another clever solution happens in the café. This small space next to the cafeteria had been underutilized, due in large part to the awkward shape of the room. "The internal space has no 90 degree angles," Sacy says. To give the space a sense of form, Idepconsult created what Sacy calls "the eggs." Made from wood covered with gypsum, these versatile oval-shaped canopies house 40W 4000K T5 Circuline lamps.

The circular fixtures and design accents throughout the building are offset by linear fluorescent battens, which are often used in the hallways to suggest circulation. In the auditorium, which has very low ceilings, linear 4-foot fixtures on a DALI control have been set within a black backdrop to support the AV needs of that space. Linear fixtures are again used in the low-ceilinged gym and dance room, in this case fluorescents with an opal diffuser. The luminaires, a composition of 8-foot lamp segments ganged together, run as long as 75 feet in places to help the cloistered basement feel roomier. "These were the most challenging areas because we had so many technical issues with the structural columns, and the mechanical, and electrical systems that needed to go here," Sacy says.

The firm's attention to detail and creative problem solving have paid off. A year after opening, the cafeteria has exceeded expectations for students as well as the administration (food sales have more than quadrupled, according to the LAU's Hamouche.) "The designers left a personal and very impressive impact on this project, especially in terms of lighting design, lighting fixture selection, and color palette," he says. "The new student center has become one of the most-visited premises on our Beirut campus." •

In certain areas of the building with high ceilings, such as the study rooms, a suspended ceiling of floating tiles made from acoustical material helps to give the space a more intimate sense of scale while also incorporating linear lighting components and sprinklers (right).

THE NEXT LIGHTING GENERATION: CHÉRINE SAROUFIM SACY

Chérine Saroufim Sacy always knew that she wanted to be an interior architect. The 34-year-old caught the design bug at age five (she was constantly rearranging the furniture in her family's living room) and is now assistant managing director and partner at Idepconsult, an architecture and engineering firm headquartered in Beirut.

It was inevitable, really, that Sacy would go into design. Her father, architect Mounir A. Saroufim, started Idepconsult in Lebanon in 1979. (It's since grown to 40 employees with offices in Beirut; Cairo; Doha, Qatar; Geneva; and Pasadena, Calif.) It's a true family affair: Her mother is the firm's accountant and her older brother, Chadi, is an architect and urban designer, as well as a partner at the firm.

Born in Beirut, Sacy and her family traveled extensively in the 1980s, in part because of the tumultuous politics plaguing their home country. "My mom was always taking us to see architecture in every new place that we went. It's one of the things that brought us together as a family," she says.

Sacy went on to earn a Masters in Interior Architecture in 2004 from the Académie Libanaise des Beaux-Arts (ALBA) in Beirut. But she felt there was something missing from her design training. "I knew the only thing that could enhance my interior architecture was lighting," she says. "You can adjust one small thing in a space with the interaction of the light and it will change the environment completely."

To further her education and fuel this interest in lighting, in 2005, Sacy moved to New York to attend the lighting design program at Parsons The New School for Design. (She graduated in 2007 with her Master of Fine Arts in Lighting Design.) This, she says, is where she became obsessed with light. "At Parsons we learned about the psychological impact of light. This is what intrigued me," she says. "I integrate light in every project because it makes such a big difference."

This passion comes through in her work. Her thesis at Parsons earned the Illuminating Engineering Society (IES) New York City Section annual thesis prize, and in 2014, she received the IES's Award of Merit for the Wadad Said Khoury Student Center at the Lebanese American University in Beirut.

Sacy, who has both Lebanese and American citizenship, contemplated staying in New York after she graduated but, ultimately, family called her home. "It's a true family business," she says, "where everything is discussed all the time." •

Details

Project: Wadad Said Khoury Student Center, Lebanese American University, Beirut • **Client:** Lebanese American University, Beirut • **Architect and Lighting Designer:** Idepconsult—Mounir Saroufim and Partners, Beirut • **Project Size:** 57,049 square feet (5,300 square meters) • **Project Cost:** $7 million • **Lighting Cost:** $200,000 • **Code Compliance and Watts per Square Foot:** Not applicable • **Manufacturers** **Debbas** (linear luminaire at entrance) • **Regianni** (downlights in the corridor with custom painted trim), **Osram** (back-of-house luminaires) • **Trilux** (40W 4000K downlights with T5 Circuline lamps in the café's suspended ceiling elements) • **Zumtobel** (28W T5 linear fluorescent fixtures in the offices and auditorium; opal diffuser added for the fixtures in the cafeteria, gym, music and dance rooms; circular fixtures in the lounges)

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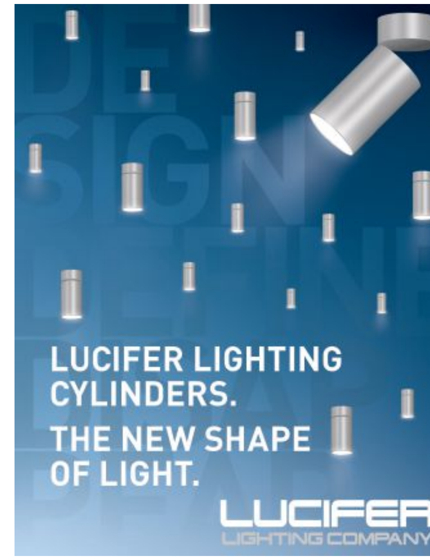

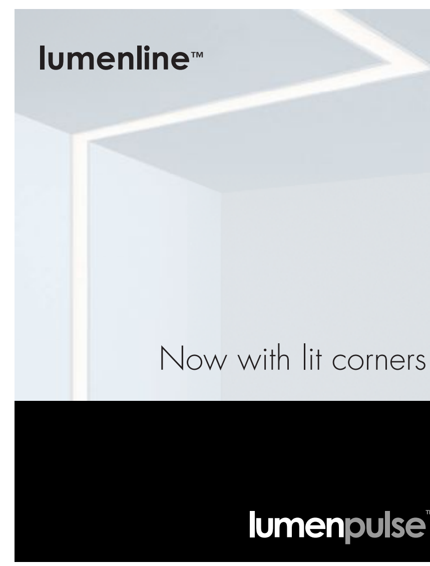

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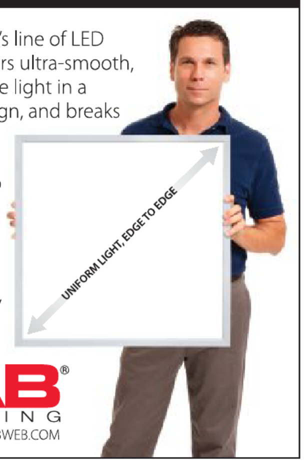

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AD INDEX

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Derek Porter

interview by Elizabeth Donoff
photo by Daniel Shea

"In education, it's easy to default to preparatory training for employment. But as an academy aspiring to make a difference, we want to grow intellectual capacity through a body of work that represents the philosophical belief of the lighting design industry. That's a big feat we all have to face if we're going to be serious about industry growth and be fully recognized as a profession."

For more than a decade, Derek Porter has merged the worlds of practice and academia as both the principal of Derek Porter Studio and director of the MFA lighting design program at the School of Constructed Environments at Parsons The New School of Design. At the root of his intellectual pursuits has always been a fundamental interest in spatial perception. Porter credits lighting designer Bruce Yarnell, his first employer, as an early influence. And then there's photography. "It allows me to step outside the boundaries of practice and to explore the topic of light and perception in ways that practice doesn't allow," he says. This position has helped him reach the next generation of lighting designers, teaching them to see lighting as not just a technical endeavor, but also a humanistic one.

How would you define lighting education?
The technical, aesthetic, and intellectual study of light, space, and human perception. This takes place through different means, including academies and manufacturer training. Both have value, but are different.

What characteristics make a good teacher? A good student?
There's not a lot of difference between a teacher and a student. They both have to invest a great deal of passion and motivation towards a topic, a curiosity, and then a rigor toward the work that results in an endless pursuit towards questions.

What are the greatest challenges facing lighting education today?
All institutions have logistical challenges that they face relative to budgets, recruiting, admissions, etc. The larger challenge is how to teach design innovation amidst these conditions.

Is there a need for more critical dialogue and discussion in architectural lighting design?
Yes, absolutely. By and large, architectural lighting design is taught as a technical trade. That's fine in some arenas, but it shouldn't be the only way to teach. We need more institutions that adopt a greater intellectual approach to creative study.

How are changes in the profession reflected in how lighting is studied and taught?
Seminal changes with technology, media applications, controls, and regulations require constant recalibration to our teaching. But there are also aspects of light relative to spatial geometry, physics, and human perspective that are fundamental and unchanged. We have to focus on those core fundamentals. •

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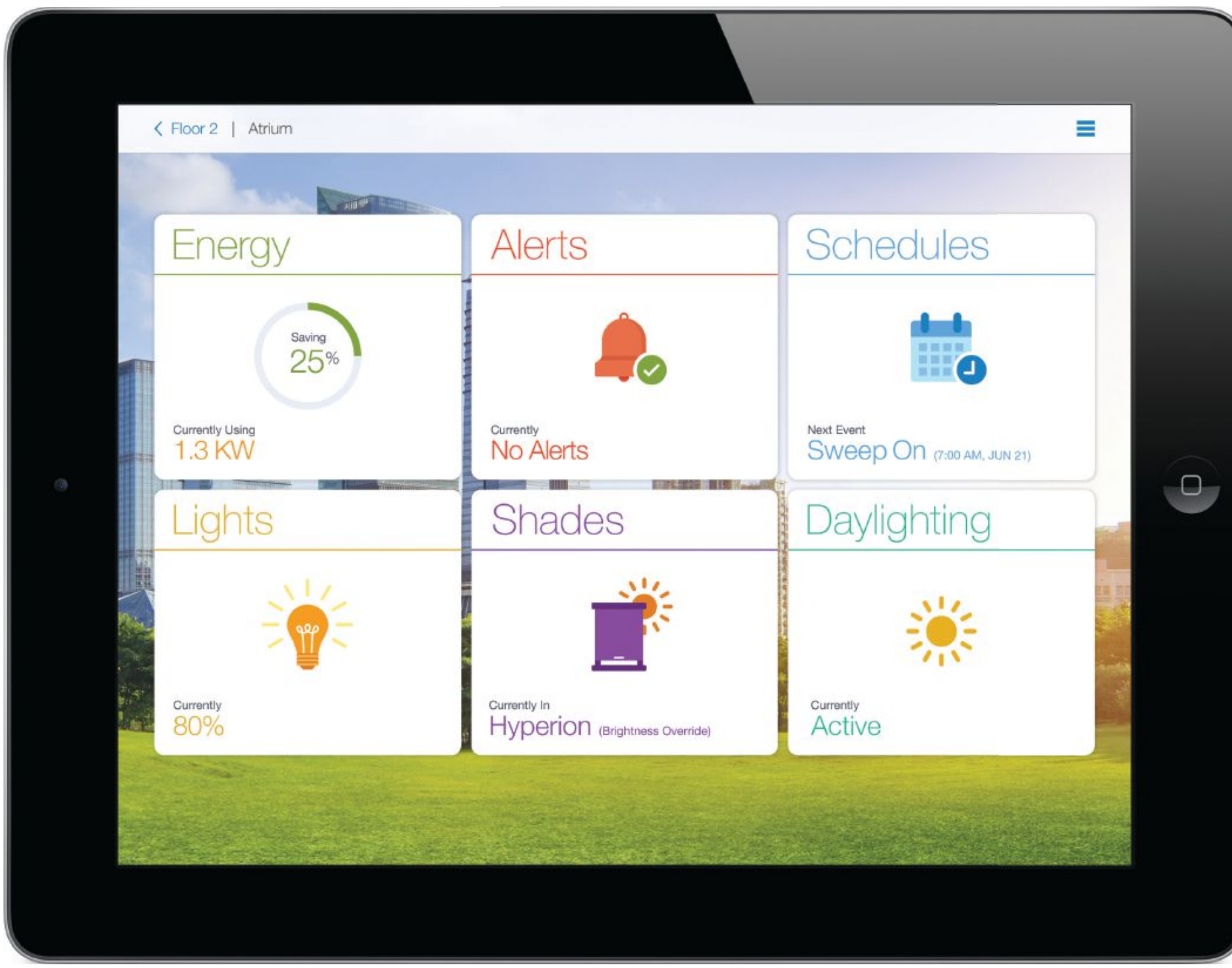

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