VOL.7 Issue 4

COMPLIMENTARY COPY

IllumiNation

OCT - DEC 2025

THE LIGHTING MAGAZINE BY ELCOMA

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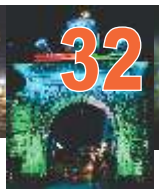

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COVER STORY

PROJECT SHOWCASE

SPECIAL FEATURE

TECH CORNER

INDUSTRY NEWS

PRODUCT SHOWCASE

IllumiNation

VOL.7 Issue 4, Oct - Dec 2025

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A Season of Bright Prospects: Innovation, Growth, and Festive Cheer

As the festive season illuminates our homes and spirits, it also casts a bright light on our industry's prospects. This year, consumer optimism is particularly high, fueled by emerging trends in smart home solutions and decorative lighting. We see ELCOMA members preparing to meet this demand with a dazzling array of innovative new products.

This positive sentiment is underpinned by strong macroeconomic fundamentals. An above-normal monsoon promises a record harvest that will boost the rural economy, while the national economy recorded an impressive 7.8% GDP growth in the last quarter, its highest in five quarters. Together, these factors create a fertile ground for growth across all sectors, including lighting.

The government's strategic focus on technology and renewable energy is unlocking significant opportunities for our industry. The PM Surya Ghar Yojana, which aims to equip one crore households with rooftop solar plants by 2026-27, is a monumental step towards decentralized renewable energy, a domain where smart lighting plays a crucial role. Simultaneously, the India Semiconductor Mission is set to transform our electronics landscape. With India's semiconductor market projected to exceed $110 billion by 2030, our nation is rapidly becoming a trusted hub for manufacturing. This will bolster our technological self-reliance and reduce import dependency for critical lighting components.

Our industry's leadership was on full display at the recent IEC General Meeting in Delhi, a flagship event where ELCOMA played a pivotal role. The exhibition theme, centered on innovations in electric mobility, lighting, and electronic components, provided a powerful platform to showcase our progress. Our panel discussion explored how smart lighting is critical to achieving India's Net-Zero target by 2070 and the vision of a developed India by 2047. The exhibits at Bharat Mandapam, featuring our industry's leading brands, demonstrated how intelligent lighting is creating safer, smarter, and more sustainable cities and workplaces, all underpinned by robust Indian and IEC Standards.

Looking ahead, ELCOMA is committed to elevating industry-wide expertise. We are proud to announce our partnership with the Bureau of Indian Standards (BIS) to organize nationwide training programs. This initiative will enhance awareness and promote compliance with the latest Indian lighting standards and regulations, reinforcing our collective commitment to quality, safety, and energy efficiency.

As the year draws to a close amidst festive celebrations, we are grateful for the invaluable contributions our colleagues have made to ILLUMINATION. We warmly encourage more members to share their insights, new technologies, and product launches to further enrich this platform for us all.

Wishing you and your families a joyous Diwali and a prosperous New Year.

AMAL SENGUPTA
Secretary General
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Buoyant Demand in Festive Season

As we step into the last quarter of this year, it is heartening to see India's economy continue on a robust growth path. Experts forecast growth of nearly 6.5% in FY26, supported by anticipated interest rate cuts from the RBI, income tax reductions that will lift urban demand, and sustained rural consumption driven by rising wages and a favorable monsoon. For the lighting industry, these positive trends offer an opportunity to innovate, expand, and deliver enhanced value to our consumers.

Equally encouraging is the outlook on retail inflation, which is expected to remain below the RBI's forecast of 3.7% for FY26. A steady rise in rural wages will further strengthen consumption demand and overall growth. Meanwhile, India's retail sector continues to experience significant expansion, powered by both domestic and international players. This presents exciting opportunities for lighting solutions to become more accessible and integral to India's modern retail experience.

That said, the global trade environment warrants close attention. The impact of US tariffs on Indian exports, effective from August 2025, is being closely observed. Lighting exports to the US will undoubtedly be affected, and we await the government's policy response, especially in light of developments following the conclusion of the tariff truce with China and upcoming visits of the Indian and Russian leadership.

On the technology front, India's semiconductor market is poised for exponential growth, expected to more than double and reach a size of USD 110 billion by 2030. With strong capabilities across equipment, materials, services, and R&D, India is well positioned to become a key contributor to the global semiconductor ecosystem. The lighting industry, like other electronics sectors, will gain immensely from this progress as it fosters local manufacturing, reduces dependence on imports, and strengthens the overall ecosystem.

With consumer spending set to rise during the upcoming festive season, the industry can look forward to a buoyant demand cycle. We anticipate this will translate into an uptick in sales, offering renewed optimism and energy for all stakeholders.

I would also like to highlight the recently concluded **BIS IEC Global Congress 2025**, held on 15th September at Bharat Mandapam, New Delhi, under the theme *"Fostering a Sustainable World: Accelerating India's Journey to Net Zero 2070 through Transformative Lighting Technologies and Policies for a Developed India by 2047."* The discussions and insights shared reaffirmed lighting's central role in shaping human wellness, urban safety, and connected efficiency. At the ELCOMA Pavilion in the BIS IEC GM Exhibition 2025, held from 15th–19th September, we showcased how intelligent lighting solutions can transform workplaces and cities into safer, smarter, and more sustainable spaces. The event was a resounding success, and I extend my appreciation to all who contributed to making our participation meaningful and impactful.

My heartfelt thanks go to the ELCOMA Secretariat for their tireless dedication and support. Their efforts continue to play a pivotal role in strengthening our community and driving forward our shared vision.

Finally, I am delighted to see our magazine gain increasing popularity both domestically and internationally. Feedback from GLA members, who also receive this publication, has been very encouraging. I urge more members to contribute their experiences, innovations, and product stories to enrich future editions of Illumination.

As we celebrate the festive season, I wish all our readers and their families a joyous Diwali and a prosperous New Year. May the months ahead bring growth, innovation, and success for all.

PARAG BHATNAGAR
President
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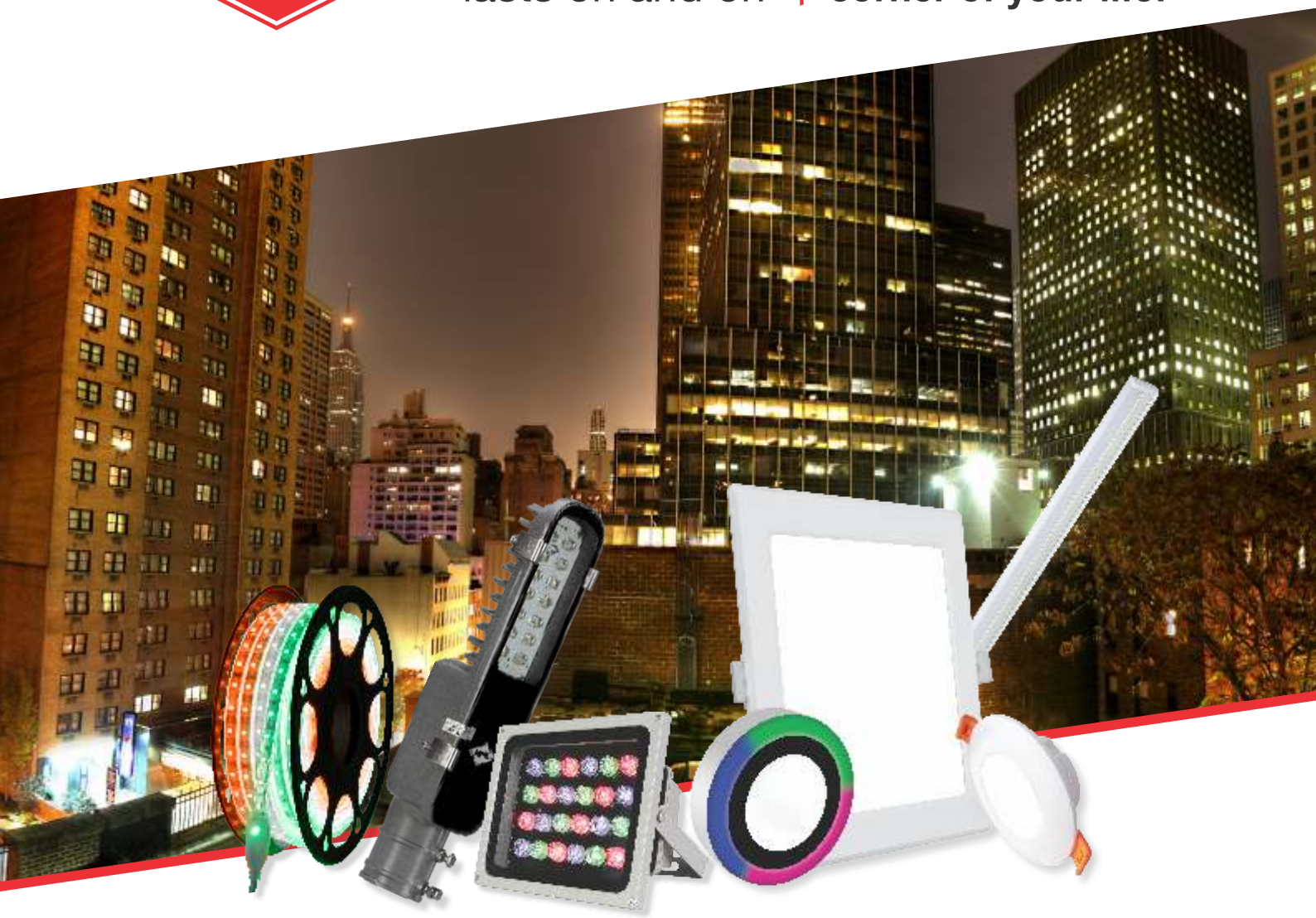

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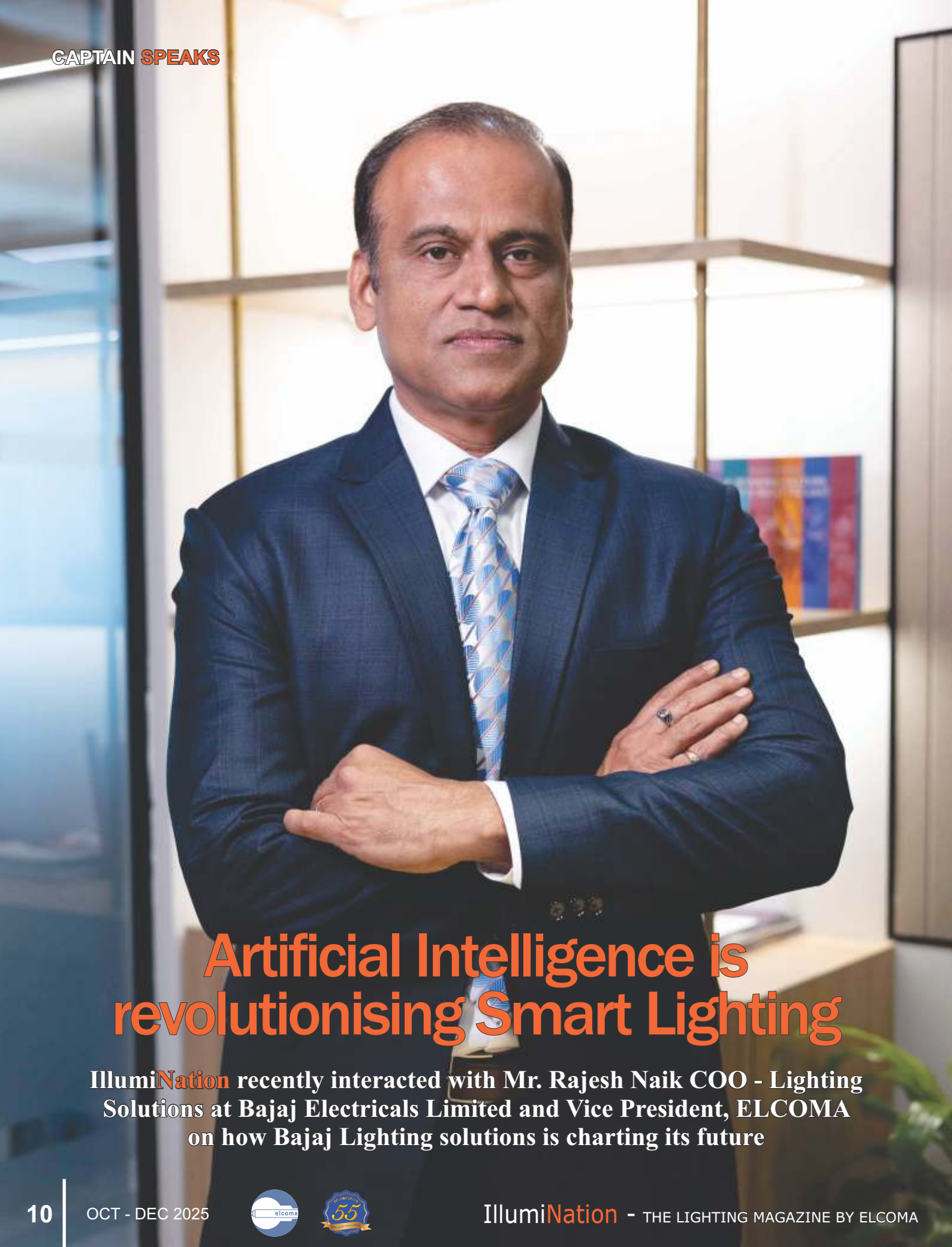


Artificial Intelligence is revolutionising Smart Lighting

IllumiNation recently interacted with Mr. Rajesh Naik COO - Lighting Solutions at Bajaj Electricals Limited and Vice President, ELCOMA on how Bajaj Lighting solutions is charting its future

You have more than 2 decades of rich experience in the industry. Please share with us how this long experience has been handy to drive the lighting business at Bajaj

Fundamental business principles transcend organisational boundaries. Decades spent in the industry honed my appreciation for the importance of building genuine relationships and cultivating industry networks, two assets that have proven invaluable at Bajaj. When backed by a strong, empowered team, a culture based on trust and inclusivity, and a keen understanding of market dynamics, leadership is able to drive transformation with agility and resilience. The lessons learned in strategic innovation, customer-centricity, and operational discipline have seamlessly empowered Bajaj's continued success in the lighting solutions domain.

What is the future roadmap for Bajaj in the lighting space?

Bajaj Electricals is committed to strategic expansion in the lighting segment and is making significant inroads in the switchgear category, with the launch of the BAJAJ SECURA range to serve domestic and commercial markets. Our exclusive partnership with SEAK s.r.o. further propels innovations in tunnel and smart infrastructure lighting, integrating advanced European technologies for efficiency and control. Bajaj maintains its leadership in sports and tunnel lighting with landmark projects such as the Maharashtra Cricket Association Stadium in Pune, Holkar Stadium in Indore, and cricket venues in Dominica. These successes underscore our technological prowess and unwavering commitment to excellence, as seen in our long-standing maintenance of advanced LED systems at the iconic Wankhede Stadium and preferred status with MPCA at Indore.

Economists project the country's GDP as 6.5% in the next fiscal and India aims to be the third largest economy globally by 2027. How will the lighting industry contribute to this economic growth?

The lighting industry is poised to play a pivotal role in India's economic trajectory, supporting critical infrastructure, urban expansion, and developments in energy efficiency. The sector remains integral to modern construction, retail growth, and technological advancements nationwide

What is in your views on the impact of the new duties imposed on India by US from 1 August on India's GDP growth in the next fiscal year?

Recent tariffs imposed by the United States are expected to slow India's GDP growth by an estimated 0.5 to 0.6 percent in the next fiscal year. Export-dependent sectors may experience near-term challenges, prompting a renewed push for domestic industry resilience and innovative strategies to counter external headwinds.

We have been hearing from Captains of industry and feedback from the market on the challenges faced in the consumer market. What is your opinion on how such challenges can be mitigated?

In consumer markets, embracing product innovation, enhancing customer experience, and strengthening retail and channel partnerships are imperative. Bajaj's commitment to premiumisation, differentiated offerings, and robust stakeholder engagement helps mitigate macroeconomic and competitor pressures. Close collaboration with influencers such as retailers and electricians ensures adaptive market responsiveness.

India's retail space sector is experiencing significant expansion, driven by both domestic and international retailers. How do you think the lighting industry can take advantage of this situation?

As India's retail sector rapidly expands, there is a tremendous opportunity for the lighting industry to offer integrated, smart lighting solutions tailored for diverse application needs. Innovative lighting, combining design, energy efficiency, and digital capabilities, can add significant value to both domestic and international retail environments.

With a positive outlook on economic growth what kind of growth are you looking at and where do you think the lighting industry will reach in terms of CAGR in the next 5 years?

The positive outlook on economic growth is expected to create strong momentum for the Lighting industry as well. While price erosion witnessed over the past several quarters may temper growth, the shift towards feature-rich products and connected solutions positions the industry to grow steadily at around 5–7% CAGR over the next five years.

As a part of the ELCOMA Board, vision 2024-26 has a priority to focus on industry Growth & Compliance. Please let us know your thoughts on areas that the group needs to work on to achieve the growth as mentioned by you in the previous question.

ELCOMA's priority will remain focused on industry-wide growth and compliance, with special emphasis on fostering R&D, capacity building, and forming strategic alliances. Supporting local manufacturing, driving standardization, and investing in skill development for all stake holders including influencers that will enable sustainable and scalable growth.

The lighting industry landscape has shifted from energy efficient products to Smart / Connected lighting. How is Bajaj Electricals embracing this change?

Bajaj Electricals is at the forefront of the smart lighting revolution, integrating IoT and advanced control platforms in products for dynamic scene management and remote operations across projects

such as MCA Stadium, Mumbai Coastal Road Tunnel Lighting and so on. This digital leap ensures enhanced energy efficiency and aligns with global trends in connected infrastructure.

It has been the endeavor of ELCOMA to support the creation of an ecosystem of local component manufacturing so that our dependency on imports reduces. How do you think the PLI Scheme supported this cause and what else is recommended by you?

The government's Production Linked Incentive (PLI) scheme is instrumental in reducing import dependency by incentivising local component manufacturing, raising global competitiveness, and supporting industry self-sufficiency. Further recommendations include streamlining approval processes and greater R&D support for indigenous design and innovation.

ELCOMA has been working closely with Government Bodies like BIS, BEE, DPIIT, MEITY, etc. in the areas of Standardization and in the regulatory front. Having the experience of being a member of industry bodies such as the Indian Society of Lighting Engineers, National Lighting Code Committee under BIS, Member of ET 23 & ET 49 Committee of BIS, and Captain in ELCOMA, please share your thoughts / advice on what more the Technical & IWG committee need to focus that will benefit the lighting industry.

Industry committees should intensify efforts in establishing rigorous standards for quality, safety, and smart lighting interoperability. Ongoing collaboration with BIS, BEE, DPIIT, MEITY, and technical groups across ELCOMA will promote harmonisation, facilitate market growth, and support leadership in lighting technology.

Moving from digitization of light to intelligent, Smart and Connected lighting, the world is now going a step ahead. We are now talking about how AI (Artificial Intelligence) is taking smart lighting to the next level. What are thoughts on that and what transformation do we expect to see in the near future?

Artificial Intelligence is revolutionising smart lighting, enabling predictive maintenance, adaptive illumination, and energy optimisation. Bajaj is also exploring in AI-powered systems to deliver intelligent, responsive environments, setting new benchmarks for connected infrastructure in Indian and international markets.

IN A LIGHTER VEIN

How do you spend your free time in weekends?
On weekends, I unwind by spending quality time with my family, exploring nature, and reading thought-provoking books.

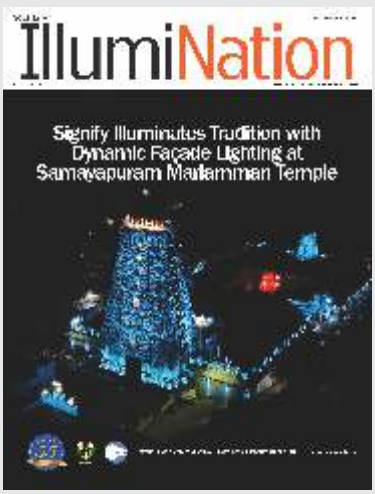
What are your hobbies?
My hobbies include listening to music, hiking in the countryside, and following cricket matches.

Which is your favorite movie?
My favourite movie is "Chak De"

What is your favorite food?
Favorite food is Masala Dosa and filter coffee

What is your favorite Holiday Destination?
My preferred holiday destination is Goa for its culture & vibes

INTERVIEWED BY ILLUMINATION EDITORIAL TEAM



We value your feedback

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Well-being, Sustainability and Personalized Experiences Drive Consumer Choices

IllumiNation met with Mr. Ripu Daman Sharma, Head of Business at Lutron to have a chat on the overall business scenario of lighting controls and future roadmap for Lutron in India

How does your brand stay relevant, engage customers, build loyalty, and promote sustainability effectively?

In an era where technology and lifestyle increasingly intersect, Lutron maintains its industry leadership by staying true to the philosophy that great lighting requires understanding human needs, masterful engineering and a disciplined approach. This approach, which we call "Lighting to Live By," resonates strongly in today's world, where well-being, sustainability, and personalized experiences drive consumer choices.

As hybrid work becomes the norm and homes transform into multifunctional spaces, Lutron's commitment to excellence, design and care proves more relevant than ever. The company's extensive product portfolio reflects a deep understanding of how lighting shapes human experiences in homes and in commercial environments.

Lutron's emphasis on human-centric lighting aligns perfectly with growing awareness of light quality impact on wellbeing. The company's intelligent systems, which seamlessly blend natural and electric light, speak to modern demands for both sustainability and sophisticated automation, helping to position Lutron at the forefront of environmentally friendly and sustainable building technologies.

The company's design philosophy elevates aesthetics and intuitive functionality, monitoring spaces that are preferences for space, privacy, comfort, and smart. By offering elegant and smart, yet simple solutions that range from dimmers to comprehensive Lighting and Automated shades solutions widely integrating with building management systems, Lutron demonstrates its ability to evolve while maintaining its core principles. An age where customer experience is paramount, Lutron's 24/7 global support reinforces its position as an industry leader.

It is said that Lutron is a design and technology-centred, customer-driven company that creates and markets innovative products. Please help us understand how Lutron has contributed to lighting that has become a seamless part of people's lives.

In 1960 Mr Joel Spira invented the world's first rotary electronic dimmer and changed the history of the lighting control industry completely. Before his invention, dimming was done by using bulky rheostats which could only dim by transforming part of electricity into heat but couldn't save any energy.

In 1961, Mr. Spira established Lutron Electronics and launched his invention in the US market. It became a big hit and quickly substituted the old-fashioned dimmers. This little rotary dimmer changed the look of home lighting controls and can still be seen today in many families worldwide.

In almost 60 years of innovation, Lutron has invented hundreds of lighting control devices and systems, and expanded their product offering from 2 products to 15,000. The company has advanced the technology of lighting control while maintaining top market leadership position by focusing on exceptional quality and design. Lutron's philosophy illuminates the human experience. The concept of human centric lighting is about creating more comfortable and engaging environments for people, just being sensitive to human needs, whether it's in an office space, home, in a hospital, in a classroom, public infrastructure space or stay in a hotel for business/vacation. With this human centric concept in mind, Lutron puts the benefits to space occupants at the core of any discussion about lighting control and technology.

It has been more than a decade that Lutron, as a brand is present in India. Please take us through the journey so far.

We maintain our top position by continuous innovations and investment in R&D to ensure Lutron stays ahead of others in the lighting control industry. Besides, Lutron remains today the only company to design and manufacture systems of dimmers and automated window shades that control both electric light and natural light, plus the most comprehensive product range in the industry, high quality, performance and our superior services including 24-7 customer support. Our lighting control solutions are scalable with constant updates to make sure that they can meet the needs of consumers for today and future. India is one of the top five markets of strategic focus and Lutron will continue to invest to enhance local capabilities to take care of customers with superior goods and services.

How has Lutron been successful in driving sustainability, space utilization and energy efficiency?

The key is to select a good lighting control system which can offer total control of electric light and natural night. Dimming can save energy and extend lamp life, which in turn reduces landfill waste. People can also use occupancy sensors or daylight sensors to eliminate energy wastage in illuminating unoccupied spaces and excessive use of electric light when there is abundant incoming daylight.

Finally we make good use of automated shades to block direct sunlight to reduce heat gain and air-conditioning energy consumption. Our sophisticated user interfacing dashboards in Athena and Quantum systems provide analytics on effective usage of spaces, thus enabling facility managers to take meaningful measures to optimize energy and space utilization

For the lighting industry, what are the top 3 technologies that can't be ignored?

The first important technology is tunable white LED lighting. The advancement of LED lighting technology and the proliferation of cost-effective LEDs have brought the capability of tunable

white lighting into the mainstream of lighting design. With tunable light fixtures, lighting controls must be chosen at the same time to ensure compatibility and performance. The two must be able to work together to achieve a successful solution. Lutron tunable white control solutions ensure seamless compatibility and perfect adjustment of color temperature and intensity to provide the right lighting experience for every space.

Another technology is the universal phase control dimming which allows users to control all load types from one product with no minimum load requirement. Even a single pinhole downlight can be its own zone. Lutron has just launched the LED+ universal phase control dimmer for care-free application and design flexibility.

The third technology is app-based lighting software that puts real time programming and personalization in users' hands. Lutron's Athena dynamic lighting control system has a user-friendly App which enables lighting designers and facility managers to personalize scenes, adjust color temperature and create timeclock events to make the light just right. The App even comes with a dashboard to streamline building management at scale and offers data visualization for space optimization, commercial energy savings, and more. Users can access it from anywhere to make global system changes, or to view reports.

What are some of the key priorities for your business? What are the opportunities and challenges ahead?

One of our priorities is to promote automated shades to various applications, including commercial, residential and public buildings. We always believe in order to achieve the best light environment, one must control both electric light and natural light in any given space. Besides Residential & Commercial spaces focus, we will also continue to develop the hospitality market with customized solutions for hotel properties including public areas and guestrooms.

We see increasing demand for wireless lighting controls and automated shades from both new and existing homes. The ongoing trends of smart home, app-based solutions and IoT can also generate a lot of opportunities to elevate comfort, convenience, energy savings and safety of spaces.

The company's commitment to innovation, quality, and service ensures Lutron's continued relevance in shaping how people interact with their environments.

What are the biggest industry shifts and trends you've noticed across the region this year?

We've observed a significant surge in demand for intelligent and sustainable building solutions. There's a growing emphasis on creating spaces that are not only aesthetically affluent but also energy-efficient and occupant-centric. Lutron's innovative solutions are driving the transformation of commercial interiors across the region. With a focus on sustainability, cultural integration, occupant well-being and smart technology, Lutron offers products that address the evolving needs of modern spaces.

From energy-efficient lighting and automated systems driven by human-centric lighting designs, we empower designers and architects to create spaces that provide luxury without compromising on functionality.

What are the biggest challenges facing the region's design industry right now?

In 2025 and beyond, commercial designers and architects face several challenges including stringent sustainability demands, rapid technological advancements, and economic uncertainties impacting budgets and timelines. They must also navigate evolving client expectations, prioritize occupant well-being, and ensure regulatory compliance, all while managing supply chain disruptions and incorporating cultural sensitivity into their designs. Balancing these complexities requires adaptability, ongoing learning, and innovative problem-solving. Lutron Solutions are leading-edge technologies that support these challenges.

What new products, projects, and innovations can we expect from Lutron in the next year?

Lutron is committed to pushing the boundaries of lighting control technology. We are excited to introduce new products that seamlessly integrate with smart home and building systems, offering enhanced user experiences and energy efficiency.

Lutron's commitment to integrating cutting-edge technology with design flexibility, enhancing user experience and addressing evolving needs in lighting and shading control. Lutron offers cloud-connected systems offering an enhanced customer experience while serving functionality with aesthetics.

Our goal is to continue providing our clients with the tools they need to create exceptional spaces exploring the height of quality in hospitality and residential spaces. Lutron's commitment to integrating cutting-edge technology with design flexibility, enhancing user experience, and addressing evolving needs in lighting and shading control.

IN A LIGHTER VEIN

How do you spend your free time on weekends?
Watching movies with family

What are your hobbies?
Playing sports, Reading

What is your favorite movie?
Chak De ! India

What is your favorite food?
Home cooked food

INTERVIEWED BY ILLUMINATION EDITORIAL TEAM

Engineered Elegance

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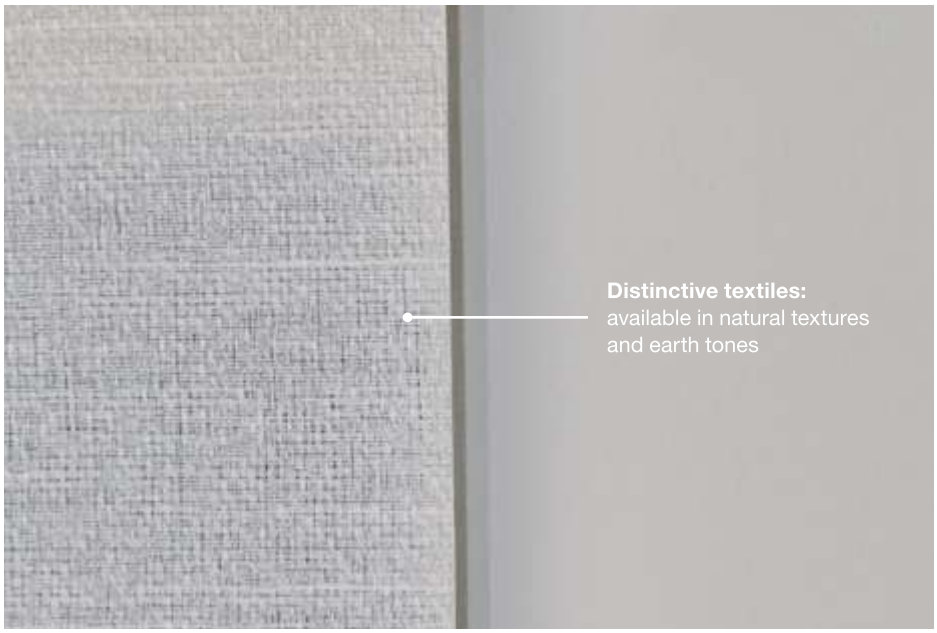
Home lighting begins with daylight control. Lutron's Palladiom shading system filters natural light into the built environment with tailored precision — elevating spaces and enriching the life lived in it.



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Bringing the best of innovation to India: Signify illuminates the Samayapuram Mariamman Temple

Committed to bringing cutting-edge innovation to every corner of India by lighting up lives, communities, and landmarks that define our cultural fabric Signify has enhanced the spiritual and visual experience at the Samayapuram Mariamman Temple through dynamic façade lighting solutions.

The Samayapuram Mariamman Temple, located in Samayapuram, a suburb of Tiruchirapalli, Tamil Nadu, stands as one of the most revered shrines in South India. Dedicated to Mariamman, the goddess of rain, health, and prosperity, the temple draws thousands of devotees every week. Also known as Samayapura Mariamman, the deity worshipped here is considered exceptionally powerful, with unique rituals and traditions that set this temple apart from others.

Architectural Grandeur in Dravidian Style

The temple reflects the essence of Dravidian architecture, a hallmark of South Indian temple design. Its monumental pyramidal towers (vimana) and pillared halls (mandapas) capture centuries of artistry and devotion. A fascinating feature is the main idol of Mariamman, crafted from clay, sand, and herbs, rather than stone or metal. Because of this delicate composition, the ritual bathing ceremonies (abhishekams) are performed not on the main idol but on the utsava murti (the processional deity). This practice underlines both the sacredness and fragility of the temple's spiritual center. Built in the early 18th century, the shrine continues to inspire awe with its architectural and cultural significance.

A Divine Glow with Dynamic Façade Lighting

To further accentuate the temple's grandeur and enhance its presence during evenings and festivals, dynamic façade lighting has been introduced. Executed by Signify, the global leader in lighting, the project utilizes RGBW floodlights and linear grazers to bring the intricate details of the temple to life after dusk.

RGBW floodlights provide vibrant color-changing options, enabling dynamic displays during -special occasions and festivals, while maintaining subtle elegance on regular days. Linear grazers highlight the vertical contours of the towers and mandapas, creating depth and drama while preserving the traditional architectural identity.

This intelligent combination of modern lighting technology with sacred heritage transforms the temple into a beacon of devotion and culture, visible from afar and resonant with spiritual energy.

Balancing Heritage and Innovation

The lighting design respects the sanctity and history of the temple, ensuring that the technology enhances rather than overshadows the sacred ambiance. Dynamic façade lighting not only improves the nighttime visual appeal but also underscores the temple's role as a cultural landmark in Tiruchirapalli.

By blending tradition with innovation, the Samayapuram Mariamman Temple sets a remarkable example of how heritage structures can be celebrated with modern technology while preserving their spiritual essence.

This project reflects Signify's belief that innovation has the power to preserve, enhance, and celebrate our most treasured spaces. As we continue to illuminate iconic landmarks across India, the lighting at Samayapuram Mariamman Temple stands as a shining example of how technology can deepen spiritual experiences while honouring cultural heritage. With every beam of light, we strive to connect tradition with progress — creating spaces that inspire, uplift, and endure.

AUTHOR: SIGNIFY INNOVATIONS INDIA LIMITED

Shaping the future of lighting for a Smarter, Greener India

Illumination caught up with Raja Moudgil, Commercial Leader Consumer Trade Sales and Switches, Signify, Greater India for a chat on how he is positioning Signify to lead the future transformation of how consumers will interact with their living spaces through innovation, partnerships, and scalable solutions tailored for India.

Could you share a bit about your journey at Signify? What aspects of your role excite you the most? With your decades of experience in lighting, how has your journey at Signify evolved, and what still excites you most about your role today?

My journey at Signify has been immensely rewarding and full of learning. I have had the privilege of working across three continents and traveling to more than 30 countries across Asia, Africa, the Middle East, and Europe. Each experience has helped shape my perspective and allowed me to contribute meaningfully to society and our customers through innovative solutions and initiatives.

What excites me the most about my role is the direct interaction I have with our customers and consumers. Every conversation is an opportunity to receive honest, candid feedback—something that often leads to tangible improvements in our products and processes. That continuous loop of learning and improvement keeps the role fresh and engaging, even after decades in the industry.

How have Indian consumer expectations changed from conventional lighting to smart solutions, and how has Signify adapted to these shifts? What are the key factors influencing consumer purchasing decisions regarding lighting products?

Over the years, Indian consumers have become more informed and aspirational. There's a growing preference for smart, energy-efficient, and aesthetically pleasing lighting solutions. The shift from basic illumination to connected, mood-based, and voice-controlled lighting has been remarkable.

At Signify, we have stayed ahead of this curve by offering a wide portfolio of smart lighting, while also investing in awareness, ease-of-use, and seamless integration with smart home ecosystems. Our vision of #BrighterLivesBetterWord and strategy are centered around innovation, sustainability, and delivering exceptional value to our customers.

The Indian market has unique price sensitivities and diverse regional preferences. How does Signify balance introducing new technologies while ensuring they remain accessible and relevant to the average Indian household?

India is a diverse market in terms of buying behaviour. Our approach has been to offer tiered product lines that cater to various segments, ensuring affordability without compromising quality. We continuously localize our innovations to align with the customer demands, from product design to pricing. We also invest in domestic manufacturing and supply chain efficiencies to make advanced lighting solutions more accessible to the average Indian household.

Connected lighting is gaining traction globally, but adoption in India has its own pace. Based on your extensive experience, what strategies have been most effective in accelerating smart lighting adoption across different Indian consumer segments?

The key has been education and experience. We have focused on demystifying smart lighting through consumer demos, influencer outreach, and retail touchpoints. Offering user-friendly products with app-based or voice controls has also helped.

Segment-specific strategies, such as bundling smart lighting with home automation or targeting new homeowners, have driven adoption. Ensuring compatibility with popular platforms like Alexa and Google Home has further simplified the user journey.

Looking at your long career trajectory in the lighting industry, what would you identify as the most significant shift in how lighting products are marketed to consumers today compared to when you began your journey?

The shift has been from product-centric to experience-centric marketing. Earlier, lighting was marketed on watts and lumens. Today, it is about mood, design, connectivity, and energy savings. Digital channels, influencer marketing, and immersive retail experiences now play a significant role. The consumer today does not just buy light—they buy an experience, and our marketing has evolved accordingly.

With your deep understanding of the Indian retail landscape developed over decades, how has Signify's distribution strategy evolved to reach consumers beyond metropolitan areas, and what unique challenges have you encountered in these markets?

We have built a robust distribution network that spans Tier 1, Tier 2, Tier 3 cities, and even rural markets. Our presence is truly pan-India. That said, the key challenges in Tier 3 and rural areas include rapidly shifting consumer preferences and expectations around faster delivery. We have responded by making our supply chain more agile and leveraging both online and offline retail partnerships to ensure availability and reach.

With your wealth of industry knowledge, what do you consider to be the most significant untapped opportunity for Signify in the Indian market, and how are you positioning the company to capitalize on it?

One of the most significant untapped opportunities for Signify in the Indian market lies in the smart home ecosystem, particularly the integration of smart lighting, fans, and switches tailored to Indian households. While awareness of smart technologies is growing, large segments of the population are still in the early stages of adoption—especially in non-metro areas. This presents a huge opportunity

for scalable, affordable, and intuitive smart solutions.

We are positioning Signify to lead this transformation by expanding our smart product portfolio, investing in consumer education, and building ecosystems that work seamlessly across platforms. Our focus is on offering solutions that are not only technologically advanced but also simple to use, accessible in price, and relevant to the unique needs of Indian consumers.

After years of observing market cycles and technological shifts, how do you balance the need for immediate business results with long-term strategic vision in your leadership approach?

Striking the right balance between short-term performance and long-term growth is essential in a dynamic industry like ours. In the immediate term, my focus is on strengthening brand visibility, expanding our product offerings, and ensuring consistent availability across both offline and online channels. We are also working to simplify our business model and make it more agile, so we can respond quickly to changing market demands.

From a long-term perspective, our strategic priority is clear—we are investing in building a comprehensive smart home ecosystem, with integrated offerings across lighting, fans, and switches. This segment represents the future of how consumers will interact with their living spaces, and we are positioning Signify to lead this transformation through innovation, partnerships, and scalable solutions tailored for India.

With more than two decades of experience in the lighting industry, what would you consider your most valuable contribution to India's lighting sector, and what legacy are you creating as you continue to shape Signify's future in this market?

Over the past two decades, my most valuable contribution to India's lighting sector has been driving the transition from conventional to energy-efficient and smart lighting solutions, while ensuring these innovations are accessible across diverse markets—from metros to rural areas. I've also focused on building strong, customer-centric teams, nurturing industry partnerships, and expanding our distribution footprint to ensure last-mile connectivity.

The legacy I aim to build is one of purpose-driven transformation—where lighting is not just about illumination but about enhancing lives, improving sustainability, and enabling smarter living. At Signify, we are not only shaping the future of lighting but also playing a pivotal role in developing a smarter, greener India.

What are the key factors influencing consumer purchasing decisions regarding lighting products? What are some of the key trends driving product innovation in the consumer lighting space in India?

Consumers today are looking for value beyond price—they want energy efficiency, reliability, smart functionality, and products that align with their lifestyle and aesthetics. Trust in the brand and after-sales support also play a crucial role. Innovation is being driven by the growing shift toward smart, connected, and human-centric lighting. Consumers want lighting that adapts to their mood, integrates with their smart home, and contributes to sustainability. It is no longer light—it is about experience, efficiency, and intelligence.

How are consumer preferences and behaviors evolving in the Indian lighting market? What are the key factors influencing consumer purchasing decisions regarding lighting products?

Indian consumers are becoming more aware, aspirational, and experience driven. Lighting is no longer seen as a utility—it's becoming a part of personal expression and smart living. There's a clear shift from just looking for brightness to seeking efficiency, design, and digital convenience.

Purchasing decisions are now shaped by a combination of energy savings, aesthetics, brand trust, smart features, and ease of use. Consumers want solutions that are intelligent, reliable, and future-ready—and they expect all of this at a competitive price point. At Signify, we're constantly listening, adapting, and innovating to meet these evolving expectations.

IN A LIGHTER VEIN

How do you pass your free time?
I enjoy reading books, listening to podcasts, and most importantly, spending time with my family.

What are your hobbies?
Playing racket sports, swimming, or going on long walks.

Which is your favourite movie/s?
Rang De Basanti and Top Gun (1986) are right at the top!

What is your favourite food?
Any homemade food—nothing beats it.

What is your favourite Holiday Destination?
Goa and Italy—they both have a special place in my heart.

INTERVIEWED BY ILLUMINATION EDITORIAL TEAM

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CRESCENT/10-2025

Polycab deploys Façade Lighting Solution at Siddharth Nagar Collectorate Office

The Siddharth Nagar Collectorate office has recently been illuminated with a state-of-the-art RGBW façade lighting system, executed by Polycab. This landmark project showcases the transformative role of modern lighting in enhancing the architectural identity of government infrastructure while promoting energy efficiency and smart control.

The installation is powered by DMX512-based intelligent lighting control, enabling seamless programming of vibrant color schemes, dynamic patterns, and themed lighting sequences. With RGBW luminaires, the system ensures superior color rendering, flexibility, and energy optimization compared to conventional solutions.

This project not only enhances the night-time aesthetics of the Collectorate building but also serves as a model for smart, sustainable, and digitally controlled façade lighting in public architecture. Through such initiatives, Polycab continues to contribute to the Government's vision of modern, energy-efficient, and citizen-friendly urban infrastructure.

Project Vision and Objectives

The project aimed to highlight the architectural grandeur of the Collectorate while supporting the Government's vision of modern, energy-efficient, and citizen-centric infrastructure. The goal was to implement a solution that was technologically advanced, environmentally sustainable, and adaptable to diverse civic needs.

Innovative Technology and Execution

At the core of the project lies the DMX512-based centralized lighting control, allowing programmable themes, dynamic effects, and calendar-linked schedules to reflect public events and national festivals.

The installation features RGBW luminaires, including LED linear wall washers, projector lights, and long-throw spotlights. It ensures:

- Superior color rendering and tunable white tones for maximum flexibility.
- Energy-efficient performance to minimize electricity consumption.
- A “living canvas” effect with

event-specific lighting transitions.

Challenges Faced and Overcome

Like any ambitious project, the Siddharth Nagar façade lighting installation posed several hurdles, which were addressed with tailored solutions

- **Architectural Integrity:** Customized mounts and angle-adjustable fixtures were designed to highlight the façade without disturbing the building's structure.
- **Energy Efficiency:** Advanced LED luminaires, paired with intelligent controls, ensured maximum visual impact with minimal power consumption.
- **Weather Durability:** IP65/IP66-rated fixtures guarantee resilience against rain, dust, and heat, ensuring long-term reliability.
- **Seamless Integration & Timelines:** A robust cabling and networking framework with redundancy measures, combined with round-the-clock execution, enabled smooth operation and on-time completion.
- **Community Engagement:** Theme-based lighting trials with local authorities helped fine-tune effects to reflect civic pride and citizen aspirations.

Transformative Impact

The project has had a profound impact

on Siddharth Nagar's civic landscape:

- **Architectural Identity:** The Collectorate building now stands out as a night-time landmark, reflecting modernity and pride.
- **Civic Engagement:** Dynamic, festive lighting fosters a sense of community and belonging among citizens.
- **Sustainability:** The use of energy-efficient LED luminaires significantly reduces energy usage compared to conventional lighting.
- **Smart Urban Infrastructure:** The adoption of intelligent lighting controls aligns with the government's digital and sustainable development goals.

Symbol of Progress and Innovation

The illuminated Collectorate now symbolizes progress, innovation, and inclusivity. Beyond aesthetics, the project demonstrates how smart lighting technology can bridge the gap between sustainability and civic pride. By merging efficiency with innovation, Polycab has set a benchmark for how public infrastructure can be revitalized with cutting-edge lighting solutions.

Key Features:

- DMX512-based centralized control for programmable sequences.
- RGBW luminaires delivering vibrant color rendering and tunable white tones.
- Use of linear wall washers, projector lights, and long-throw spotlights.
- Calendar-based dynamic lighting themes for festivals and civic events.

The Siddharth Nagar Collectorate now stands as a glowing landmark, symbolizing progress and innovation in public infrastructure.

AUTHOR: POLYCAB INDIA LIMITED

BIS IEC GM 2025 Exhibition at Bharat Mandapam

Shri Piyush Goyal, Hon'ble Union Minister of Commerce and Industry, inaugurated the BIS IECGM exhibition, held from 15th to 19th September 2025 at Bharat Mandapam, New Delhi.

"These exhibits are more than a showcase of industry and innovation," the Minister remarked. "They are, in many ways, a celebration of the power of standards and conformity assessment. Standards are the invisible framework that shapes the world around us. They ensure that our infrastructure is safe, our systems are efficient, and our processes are trusted. They are the heartbeat of industry, accelerating innovation, enabling global trade, and driving sustainable development."

The exhibition, located in Hall 14 at Bharat Mandapam, provided a platform for innovators in the electrotechnical field to display groundbreaking work while fostering networking and collaboration.

ELCOMA and its leading members participated wholeheartedly in the exhibition, showcasing their latest innovations in lighting to demonstrate the industry's readiness to support India's vision of becoming a Net-Zero and developed nation.

Hon'ble minister Shri Piyush Goyal also inaugurated ELCOMA's founding member SIGNIFY's pavilion which showcased *groundbreaking product lines designed to redefine lighting efficiency, sustainability, and user wellbeing. These solutions demonstrated how advanced lighting can power Indian industries, offices, public spaces, and streets with energy savings, comfort and smarter performance.*

Glimpses of the ELCOMA pavilion during the BIS IEC GM Exhibition held from 15th to 19th September 2025 at Bharat Mandapam, New Delhi

Mr. Amal Sengupta, Secretary General, ELCOMA with Shri Pramod Kumar Tiwari, Director General, Bureau of Indian Standards (BIS)

ELCOMA Lounge

Signify stall

Sunpu stall

Eetamax stall

Polycab stall

Sturlite Stall

Lutron stall

ELCOMA Hosts Panel Session on Smart Lighting at BIS IEC GM 2025

ELCOMA hosted a panel session themed on 'Fostering a Sustainable World' entitled “Smart Lighting: Accelerating India's Journey to Net Zero 2070 and a Developed India by 2047” on 15 September 2025 at Auditorium 1 in Bharat Mandapam, New Delhi

The panel was moderated by Mr. Nitish Poonia, Signify Innovations India Limited and comprised of several esteemed speakers, who shared their invaluable insights with the distinguished audience at the BIS IEC General Meeting 2025. The panelists were Smt. Asha Nangia, MeitY, Mr. Maurice Maes, Global Lighting Association, Mr. Pushparaj Giri, Havells and Mr. Girish K Chawla, Signify Innovations India Limited.

The session highlighted the vital role of smart, energy-efficient, and IoT-enabled lighting in advancing India's national goals of achieving Net-Zero emissions by 2070 and becoming a developed nation by 2047.

Discussions focused on transformative technologies, including ultra-efficient and connected lighting solutions, and assessed the industry's readiness to deploy them to accelerate a sustainable future. The panel also explored the significant impact of solar-based off-grid lighting for illuminating public places, roads, and highways without burdening the electrical grid.

Furthermore, the experts underscored that unlocking smart lighting's full potential hinges on strong policy support, effective cross-ministerial coordination, and robust collaboration between industry and regulatory bodies. This synergy was identified as a key driver for India's decarbonization and sustainable development journey.

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Innovative Lighting Design for Modern Architecture at Patna International Airport by Orient Electric

Illuminating the New Terminal at Jay Prakash Narayan International Airport, Patna with Innovative Lighting Design by Orient Electric

On May 29, 2025, Hon'ble Prime Minister Sh Narendra Modi inaugurated the new terminal building of Jayprakash Narayan International Airport in Patna. Bihar Chief Minister Nitish Kumar and Union Minister of Civil Aviation Kinjarapu Ram Mohan Naidu were also present.

In the world of lighting design, precision, aesthetics and functionality must go hand-in-hand. For the newly inaugurated terminal at Jay Prakash Narayan International Airport, Patna, the design philosophy goes beyond conventional lighting solutions, integrating cutting-edge technologies and bold product selections to create a space that is as functional as it is visually prominent. From the moment passengers arrive at the departure area to the breathtaking illumination of the terminal's crown, the lighting design redefines what's possible, bringing an unparalleled level of sophistication and efficiency to the forefront.

The departure area, a critical zone in any transportation hub, is illuminated with 200 numbers of LED high-bay light fixtures, each rated at 200W with a color temperature of 5700K. These fixtures were carefully selected to ensure uniform lighting distribution while maintaining energy efficiency. The result is a well-lit, visually open environment that supports the safe movement of passengers and vehicles. The choice of high bay lighting not only meets the functional needs of the area but also complements the terminal's clean, modern aesthetic.

Moving inside, the internal circulation spaces are highlighted using 400+ LED Downlights, each with a 20W output and CCT of 4000K with 80 CRI. These downlights are integrated with an Uninterruptible Power Supply (UPS) system, providing emergency lighting in case of power outage. The combination of reliability and energy efficiency makes this a key component of the terminal's lighting design. The 4000K color temperature offers a neutral yet welcoming glow, ensuring optimal visual comfort while maintaining clarity and focus for both staff and passengers navigating the area.

One of the standout features of the terminal is the engraved red stone backdrop behind the check-in counters. To enhance the depth and texture of this feature, 200+ LED Linear wall grazers, each rated at 24W with 2700K CCT, were strategically placed. The warm, low-temperature lighting contrasts beautifully with the functional lighting of CCT of 4000K, elevating the space and providing a visual focal point that combines both form and function. This careful balance between warm accent lighting and neutral ambient lighting underscores the thoughtful product selection in the project.

Externally, the lighting design enhances the visual impact of the terminal's flag mast. Using four 250W LED Projector Lights with 5700K color temperature, ensured the mast remains a striking feature at night. The cool white light casts a clean, sharp glow that enhances the structural and architectural significance. It's a perfect example of how strategic lighting design can

transform a simple architectural element into a dramatic, eye-catching landmark. Additionally, the plants scattered throughout the terminal's landscape area are precisely illuminated using a mix of 10W and 20W spotlights with 3000K CCT, creating a warm, inviting atmosphere that aligns with the terminal's natural design ethos.

Another standout feature of the new terminal is the extensive use of traditional Bihari art, including Madhubani paintings and Mithila motifs (Chhath festivities, Chanakya, Lord Buddha, Mahavira and the cradle of civilization), to celebrate the region's rich cultural heritage. These artistic elements are prominently displayed in the interior of the terminal building, creating a visually engaging and culturally immersive environment for travelers. To further enhance their impact, LED Linear Light fixtures with 2700K CCT and elliptical beams have been strategically integrated, improving the visibility of the artwork in both the arrival and departure areas. This thoughtful lighting design not only accentuates the aesthetic appeal but also deepens travelers' appreciation for the historical and cultural significance of the state.

The arrival area offers a similar approach to lighting the terminal's architecture, with 70 strong pillars illuminated by RGBW LED in-ground burial fixtures. These 45W fixtures offer dynamic color control, allowing the lighting to adapt to seasonal themes or special events. This flexibility highlights the commitment to innovative lighting solutions that can evolve with the space.

The Crown of the new terminal's building is addressed with striking RGB LED Strips that run along the building's crown. At a total length of 3.5 kilometers, this illuminated feature offers both visual drama and versatility, creating a dynamic "wow" effect visible from afar. Whether for national events or everyday use, the programmable RGB strip enhances the terminal's architectural identity, proving how lighting can transform a space into a constantly evolving, vibrant element of design.

At Orient Electric Ltd., we understand that lighting is not just about illumination – It's about creating an experience that enhances architecture and serves the functional needs of modern spaces. With a keen eye for product design, a deep understanding of color temperature dynamics, and a commitment to quick, efficient project execution, we ensure that every project we take on becomes a benchmark in lighting excellence.

AUTHOR: ORIENT ELECTRIC LIMITED

Eveready Creates a Symphony of Light and Culture With their Facade Lighting at Mathura's Holi Gate

Strategic use of specialized RGBW luminaires transforms a historic landmark into a nocturnal icon, enhancing both aesthetics and spiritual ambiance.

Eveready Industries India Ltd., recently unveiled a breathtaking facade lighting project for the iconic Holi Gate in the sacred city of Mathura. This project goes beyond mere illumination and is a thoughtful architectural dialogue that respects the past while employing cutting-edge RGBW lighting technology to celebrate the city's rich cultural and spiritual heritage.

The challenge was to accentuate the gate's intricate architectural details, create a sense of grandeur, and evoke its joyous spirit. The solution required a meticulous, tunable lighting scheme that would add depth, texture, and dynamic illumination without compromising the structure's dignity.

The Design Philosophy: Precision and Poetry in Light

The lighting design employs a layered approach, using a precise combination of luminaires from Eveready's professional range to achieve specific visual effects:

Laying the Foundation with Wall Grazing: To highlight the magnificent texture and vast scale of the gate's walls, Eveready utilized 60W RGBW Wall Washer Lights with a 15° x 30° asymmetric beam angle. This specific beam was chosen to throw a wide, even wash of light vertically, grazing the surface to reveal every nuance of the stonework and creating a luminous canvas against the night sky. The careful balance of intensity and the pure white light from the dedicated white LED chip ensure the facade is brilliantly

illuminated without any harsh glare or color distortion.

Architectural Emphasis with Linear Precision: For defining the gate's strong, defining arches and long horizontal lines, 100W RGBW Linear Flood Lights with a tight 15° beam angle were deployed. Their intense, focused beam cuts through the darkness with clarity, drawing the eye to the key architectural elements and creating a powerful silhouette. This precision lighting adds a modern, sharp contrast to the ancient structure, emphasizing its form and strength, while the RGBW capability allows for future thematic color lighting.

Highlighting the Upper Crown with Sacred Light: To draw attention to specific religious symbols like the lotus on the top of the dome and other intricate features, 15W RGBW Spot Lights with a 25° beam angle were strategically placed. These spots act as the jeweler's touch, adding sparkle and focus. They create points of interest that guide the viewer's gaze and add a layer of sacred significance to the overall composition, with the option to illuminate these symbols in a reverent, pure white or a soft, devotional hue.

The Result: A Nocturnal Landmark is Born

The transformation is nothing short of spectacular. By night, the Holi Gate is no longer just a passageway; it is a destination. The careful interplay of light and shadow has given the structure a dynamic, three-dimensional quality. The warm, inviting glow from the sophisticated RGBW system reflects the spiritual warmth of Mathura, making it a beacon for pilgrims and tourists alike. The technology provides the flexibility to create immersive experiences for different festivals and seasons.

The project stands as a benchmark for future heritage lighting initiatives in India, demonstrating sensitivity, technical excellence, and a profound respect for the subject.

AUTHOR: EVEREADY INDUSTRIES INDIA LTD

Sikkim's Rangpo Cricket Stadium Achieves National Broadcast Lighting with Havells

The Sikkim Cricket Association wanted its stadium in Rangpo to host matches with live broadcasts which meant that the challenge was that the lighting had to meet the stringent standards of modern-day sports broadcasting. Making the field visible was of course the primary goal, however, much more difficult were the standards of broadcast-grade illumination, where every single detail of the action needs to be seen clearly. These challenges ensured that the project was anything but standard.

Havells responded with a bespoke solution anchored by its new 1200W modular LED sports floodlights. Each luminaire delivers over 130 lumens per watt, engineered for both horizontal and vertical uniformity. This ensures even facial illumination and ball visibility for HD cameras, preserving colour accuracy, and eliminating shadow artifacts that can disrupt live coverage.

The system was engineered to maintain strong vertical illuminance, which is essential for picking up facial features and ball movement during telecasts. Special attention was paid to minimizing glare and shadowing, not just for cameras but for athletes and spectators, as well.

Each unit was paired with an IP67-rated external driver, integrating surge protection, thermal management, and voltage cut-off which is a necessary safeguard against Rangpo's volatile climate, ensuring system reliability even as temperatures and humidity levels fluctuated unpredictability.

The technical challenge was compounded by Rangpo's terrain. The mountainous site, with limited access and non-standard mast positions, rendered conventional installation techniques unworkable. Instead, each luminaire had to be installed individually after the masts were erected, requiring careful coordination and adjustment on-site.

This approach was only feasible because of the modular, rugged build of the luminaires, which allowed for secure handling and precise aiming even in less-than-ideal conditions. Throughout the installation, the team maintained strict adherence to lighting metrics, including uniformity ratios, beam orientation, and electrical load, without deviation from the original design.

What made the project work was close collaboration between Havells engineering team, local contractors, and the client. Multiple rounds of simulation and on-site tweaks were needed to adapt to the realities of the site, but the result was a stadium that met national broadcast standards with high-quality lighting - high vertical and horizontal illumination, minimal glare, uniform lux levels, and complete elimination of visual dead zones. The system allowed for an elevated experience, both for athletes on the field and audiences watching across the country.

For Sikkim, it's a technical upgrade that puts the region's sporting infrastructure at par with the rest of the country, delivered in one of the most challenging environments for stadium lighting anywhere in India.

AUTHOR: HAVELLS INDIA LIMITED

LED Driver Technology for Solid State LED Electronics

An article that reviews LED driver technologies for DC-Supplied Drivers, AC-Supplied Visible Light Communication (VLC) drivers.

Light Emitting Diodes (LEDs) are now the primary lighting source due to their outstanding performance. Nevertheless, LEDs must be driven by a current-controlled driver. The strong demand for LEDs in numerous applications has led to rapid development in LED driver technology. LEDs are widely used due to their high efficiency, compact size, durability and excellent color performance. However, because they behave like voltage-driven devices, they require current-limiting circuits to operate safely and avoid overheating.

A. DC SUPPLIED LED DRIVER SYSTEM

DC-supplied LED drivers have a DC power source as a primary source, such as batteries, solar panels, DC grids etc. as shown in Fig. 1. They can even be supplied by an upstream power factor (PF) converter as a DC source. Depending on power rating and control requirements, it can be classified into four different categories

1. **Passive drivers:** They use only passive components and diodes to control the current through LEDs. They are very much simple, robust, no electromagnetic interference (EMI) and cheapest. They exhibit very poor current regulation and low efficiency. Fig. 1(a) shows the typical schematics of such power supplies.
2. **Linear drivers:** In this type of drivers, bipolar or MOSFET transistors are used in the linear region. It create a current source so that LED current can be tightly controlled. Relatively more complex than passive drivers, they still retain most of their advantages. But lower efficiency persists, due to the inherent losses of the devices operating in the linear region. Diagram is shown in Fig. 1(b).
3. **Switched-capacitor (SC) drivers:** In these drivers, the energy conversion is carried out by a charge transfer from one capacitor into another. SC drivers can be efficient, compact, EMI-free and appropriate for on-chip integration, owing to the lack of inductors. They are used mainly in low-power applications, due to the difficulty of obtaining high efficiencies at high power ranges. Resonant SC converters comparatively reduce losses and increase the efficiency. Fig. 1(c) shows the schematics of SC driver.
4. **Switched mode drivers:** This type of driver employs switched inductors/transformers together with filtering capacitors to perform the power conversion and to drive the LED at the correct operating point. They have many advantages, such as high efficiency, tight LED current regulation, a high input output voltage conversion ratio and ease of implementation in as dimming requirement. Thus, they can be used as LED drivers in a broad power range that goes from a few watts to several hundreds of watts. Few disadvantages can be highlighted compared to previous LED drivers, such as higher EMI, higher complexity and lower reliability Most switch mode LED drivers come from conventional switch mode DC–DC converters, in which many operation strategies and control methods have been adapted to the particular requirements of LED lamps, namely, LED current control and light dimming. Fig 1(d) shows the diagram of switched mode LED driver.

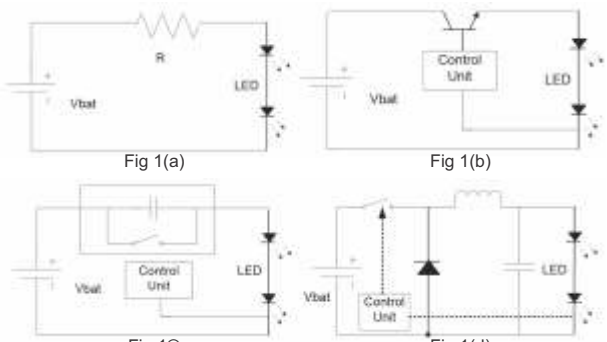

Fig.1 DC Supplied LED drivers

B. CONTROL METHODS

In recent years, design engineers have proposed several new control methods of switched DC–DC converters, many implemented in specific control integrated circuits (ICs) that are available in the market. The most relevant control methods are reviewed here and Table 1 summarizes the comparative control systems for LED drivers.

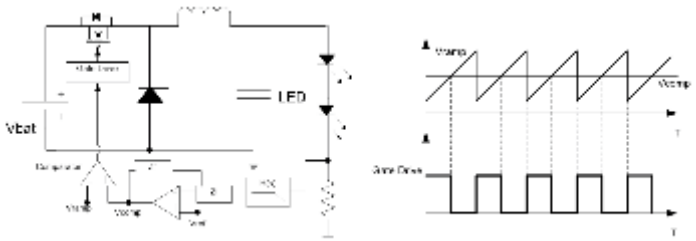

Fig.2 Voltage Mode Control

Table 1: Switching LED drivers control method comparison

Control Method	Closed-Loop Compensation Required	Constant-Frequency Operation	Slope Compensation Required	PWM Dimming Performance	Topologies of Application
Voltage Mode	Yes	Yes	No	Poor	Any
Current Mode	Yes	Yes	Yes	Poor	Any
Hysteretic	No	No	No	Good	Buck
On Time	No	Yes	No	Good	Buck
Off Time	No	No	No	Good	Any

1. Voltage Mode Control with LED Current Loop

Fig. 2 is a schematic circuit of voltage mode control with the LED current loop. This is a well-known control method based on the generation of a constant-frequency variable-duty-cycle-driving waveform by comparing the output of the compensator with a sawtooth waveform. The current through LEDs is measured and compared with a reference value. The output of the compensator adjusts the switch duty cycle so that the LED current is regulated. This control method can be used with any buck, boost or buck–boost-derived topology and has the advantage of constant-frequency operation. Among its disadvantages, the relatively complex dynamics. These dynamic exhibits one complex pole and, in the case of boost- and buck–boost-derived topologies, an additional right half-plane (RHP) zero, whose frequency depends on the duty cycle. Since RHP zero behaves like a pole from the point of view of the system phase. It produces an increase in the system phase, the converter tends to be more unstable, requiring more complex compensator schemes. Other disadvantages are the extra circuitry required for switch overcurrent protection and the difficulty of using push–pull converters, due to possible transformer saturation. Therefore, this control method is not very popular with LED-driving applications.

2. Peak Current Mode Control With LED Current Loop

Peak current mode control (PCMC) is widely used in LED drivers where the inductor current itself is used to control switching. The switch turns on until the inductor current reaches a set peak, then turns off for the rest of the cycle. This method offers simple single-pole dynamics, constant-frequency operation, easy overcurrent protection and prevents transformer saturation, making it suitable for buck, boost and buck–boost converters. However, it becomes unstable for duty cycles above 0.5 without slope compensation and is more prone to noise due to current sensing. Despite these drawbacks, PCMC is popular in LED applications because it provides precise, fast and reliable current regulation. The typical control circuit is illustrated in Fig.3. There are plenty of ICs use peak current mode control as their main driving technique.

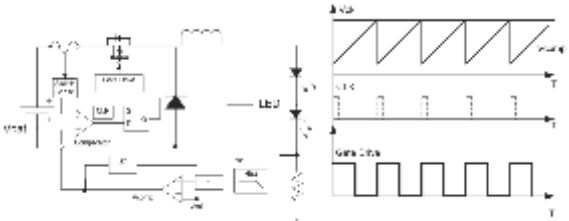

Fig.3 Peak Current Mode Control

3. Hysteretic Control

The hysteretic control method regulates LED current by switching the transistor off when the inductor current exceeds an upper threshold and back on when it falls below a lower threshold, forming a hysteresis band. It directly controls current without closed-loop compensation, making it simple, low-cost, reliable and very fast—well suited for PWM dimming. However, it operates with variable frequency, which can cause EMI issues and it is limited to buck converters only. A basic diagram and waveform are shown in Fig. 4. However, its main disadvantage is variable- frequency operation since both the switches on time and off time are variable and dependent on the input and output voltages. Therefore, the use of this control method in EMI-sensitive applications can be limited. Another disadvantage of this method is that it can be used only for buck type converters.

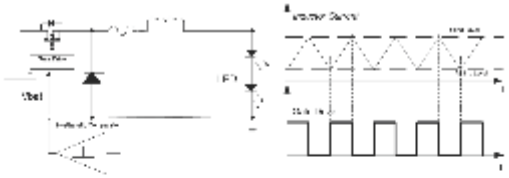

Fig.4 Hysteretic Mode Control

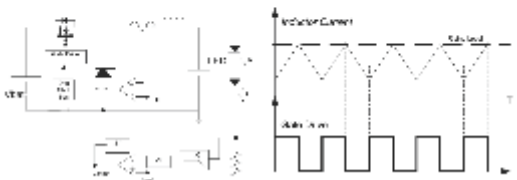

Fig.5 ON Time Control

4. ON Time Control

The on-time control method regulates LED current by

fixing the switch on-time at each operating point, turning the switch off afterward and determining the next turn-on instant when the inductor current falls below a set threshold. While it can be applied to buck, boost and buck–boost converters, it requires closed-loop compensation and operates with variable switching frequency, which adds complexity. To address this, adaptive on-time control is often preferred, especially in buck-derived topologies, as it eliminates the need for closed-loop compensation, simplifies the circuit, lowers cost and maintains LED current regulation more efficiently. Fig.5 shows the circuit diagram and waveform.

5. OFF Time Control

Off-time control turns the switch off for a fixed time, then on until the inductor current reaches a set peak. It starts with an initial pulse at power-up. It automatically adjusts to input voltage changes without feedback and works

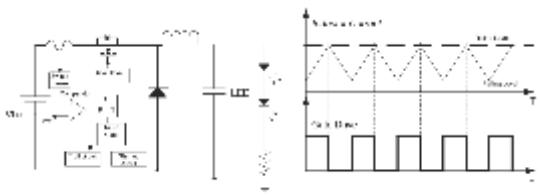

Fig. 6 OFF Time Control

with any converter type, but the variable frequency can cause EMI issues. Fig.6 shows the diagram and switching waveform.

C. AC SUPPLIED POWER SUPPLIES

AC LED drivers are the most used, due to the AC nature of utility power supply. Because of their wide variety, they are often classified based on factors like input type, power rating, features or technology. AC-supplied LED drivers can be classified firstly by AC input type (single-phase, low/high voltage or three-phase) and then further by power stages and driver features.

1. Single-Phase AC Supplied LED Driver

Unlike DC LED drivers, AC-supplied LED drivers must comply with several regulations, such as Energy Star, IEC 61000-3-2 for harmonics and flicker standards. These add extra responsibilities beyond delivering a constant, controlled current to the LEDs. Single-phase AC LED drivers are typically classified into four main types based on their construction and number of power stages. Fig.7 shows the single-phase AC supplied LED driver different topologies schematics block diagram.

1. **Single-Stage Driver:** These converters are commonly used in commercial LED drivers due to their simplicity, fewer components and easy control. They typically use a single DC–DC converter, often operating in DCM or using a flyback design for isolation. However, they fall short in high-power, universal input or dimming applications where meeting all regulations becomes challenging. Fig.7(a) shows the block diagram.

2. **Cascaded Two-Stage Driver:** Two-stage converters address the limitations of single-stage designs by using one stage for power factor correction (PFC) and another for regulating LED current. This topology allows for better power quality and the integration of advanced features like soft switching (ZVS, ZCS) to improve efficiency. Boost converters are commonly used as the PFC stage due to their good input current shaping and low EMI needs. The second stage is often an isolated converter (e.g., flyback, LLC, CLCL or electronic transformer), especially when precise current control or a third stage is required. Non-isolated options like the buck converter also exist, offering high efficiency without isolation. Buck–boost converters operating in DCM or boundary mode are also promising PFC candidates. However, using two stages increases component count, control complexity and cost and may reduce overall efficiency. Fig.7(b) shows the schematic diagram.

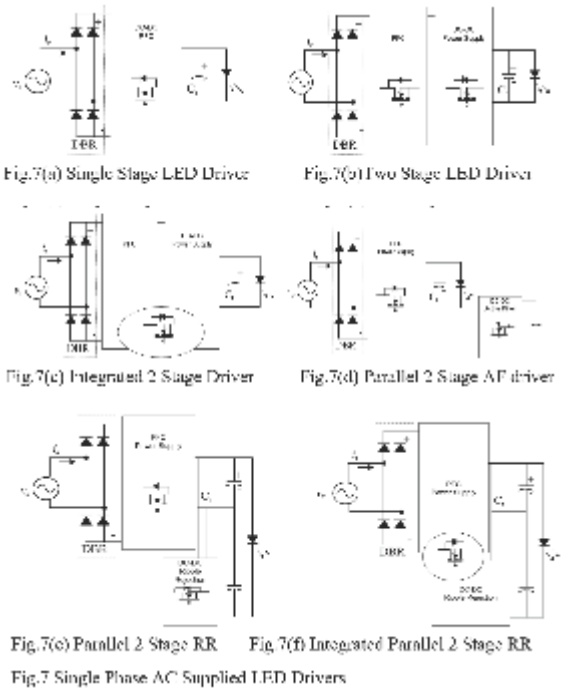

Fig.7(a) Single Stage LED Driver
Fig.7(b) Two Stage LED Driver
Fig.7(c) Integrated 2 Stage Driver
Fig.7(d) Parallel 2 Stage AF driver
Fig.7(e) Parallel 2 Stage RR
Fig.7(f) Integrated Parallel 2 Stage RR

Fig.7 Single Phase AC Supplied LED Drivers

3. **Integrated Cascaded Two-Stage Driver:** Integrated converters offer a middle ground between single-stage and two-stage designs. They include both PFC and power control stages but use a single shared switch, making them single-stage by control but two-stage by power processing. Due to the single-switch operation, they cannot employ advanced control methods for ripple reduction or PF enhancement and must rely on

careful design to meet standards. In market there are various integrated LED driver designs. Fully integrated converters further reduce size and improve efficiency by combining switches and inductors into single components. This design is illustrated in Fig.7(c). Table 2 lists the commonly used integrated converters and their number of components and their features.

4. **Parallel Two-Stage Driver:** To improve efficiency in two-stage converters, designers have explored reducing the energy processed by one converter. This leads to non-cascaded, parallel configurations, where the main converter handles PFC and a secondary converter manages ripple, managing only part of total power. This setup is shown in Fig. 7(d). It enhances efficiency and reduces required capacitance. Two main approaches in such design are active filtering (using a bidirectional converter in parallel with LEDs) as in Fig. 7(e) and ripple reduction (via multi-output ripple cancellation) as in Figure 7(f). For even greater compactness, efficiency and lower component count, integrated parallel converters have been developed combining both switches into one and further into fully integrated designs with a single switch and a shared inductor core. For the sake of more compact size, higher efficiency and a lower component count, integrated parallel converters are introduced, where the two switches are integrated into one switch.

2. Three-Phase ac-Supplied LED Drivers

Three-phase LED drivers are less common than single-phase ones and are typically used in specific applications like industrial sites, stadiums and convention centers. Their limited use is due to the lack of universal three-phase access and varying grid standards worldwide. However, they offer significant advantages: a more stable power supply reduces flicker without needing large electrolytic capacitors, improving lifespan and reducing complexity. Flicker occurs at six times the line frequency, compared to two times in single-phase systems. Common topologies include the three-phase boost and flyback converters, offering high power factor, isolation (in the flyback)

Table 2: Comparative list of integrated driver components

Integrated Inverter	Double Buck-Boost	Buck and Flyback	Buck Boost and Class E Resonant	Flyback and Class E Resonant	Boost and LLC Resonant	Buck Boost and LLC Resonant	Fully Integrated Buck Boost
Switches	1	1	1	1	2	2	1
Inductors	2	1	3	2	1	2	1 Coupled
Transformers	0	1	1	2	1	2	0
Diodes	3	4	6	4	4	6	4
Capacitors	2	2	4	4	6	5	2
Switch Stress	720V @200VO/P	700V @48V O/P	600V @ 50V O/P	500V @50V O/P	750V @50V O/P	400V @50V O/P	300V @35V O/P
Bulk Capacitor Voltage	366V	60% of Input	160V	200V	430V	420V	35V
Electric Isolation	No	Yes	Yes	Yes	Yes	Yes	No
Universal Operation	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Efficiency @ 100W O/P	<85%	<90%	<91%	<90%	<91%	<91%	<93%
PF	>0.95	>0.95	>0.99	>0.93	>0.98	>0.99	>0.99

and simple control. Advanced designs use multi-switch control to enhance phase current shaping and reduce flicker. Two-stage and modular three-phase drivers are also in application, some without galvanic isolation or electrolytic capacitors, aiming for higher efficiency, lower flicker and longer lifespan.

D. VISIBLE LIGHT COMMUNICATION LED DRIVERS

Dual-purpose LED drivers are an emerging technology that supports both lighting and Visible Light Communication (VLC) by supplying average current for illumination and modulating high-frequency signals for data transmission. VLC is gaining attention for IoT applications and as a secure, high-speed alternative for short-range indoor communication, including uses like Li-Fi, indoor navigation, carefully balance both functions: ensuring high efficiency, no flicker and regulatory compliance for lighting, while also achieving high data rates and low bit error rates for communication. This makes driver design complex, requiring consideration of modulation schemes, modulator types and power topology. VLC leverages the LED's forward current: its average value governs brightness, while its alternating component carries the data—requiring modulation frequencies high enough to avoid flicker.

- **Modulation Strategies for VLC**

Visible Light Communication (VLC) uses irradiated light to transmit data, requiring modulation techniques that maintain average illumination for human perception and avoid flicker effects.

1.1 Modulation Categories

- **Baseband Modulation:** Signals are transmitted directly without frequency shifting. Examples include On–Off Keying (OOK), Variable Pulse Position Modulation (VPPM), Two-level Pulse Amplitude Modulation (PAM) and Multi-level PAM (e.g., 4-PAM, 8-PAM)
- **Flicker Mitigation:** Encoding schemes like Manchester, 4B6B, 8B10B, Run-Length Limited (RLL) codes.
- **Passband Modulation:** Signal is modulated onto a higher-frequency carrier wave. Examples include Phase-Shift Keying (PSK), Frequency-Shift Keying (FSK), Quadrature Amplitude Modulation (QAM) and Orthogonal Frequency-Division Multiplexing (OFDM)

1.2 Modulator Type

The modulator in VLC systems controls how the data signal is applied to the LED current. It must be efficient and capable of operating at high frequencies without distorting the signal. There are three main types of modulators:

- **Linear Mode Modulators (LMMs):** Uses transistors in the linear region (e.g., Class A, B, AB, C amplifiers) and possesses high signal fidelity and data rates and low efficiency due to power dissipation
- **Switching Mode Modulators (SMMs):** Use transistors in the saturation region, often sharing hardware with the LED driver. It has high efficiency and is cost-effective but has limited data rates compared to LMMs. The technique's uses are like duty cycle modulation or ripple control.
- **Switch-Based Modulators:** Use an additional switch to turn the LED on and off, producing rectangular pulses only. It is simple and efficient with limited modulation capability. Includes Series Switch Modulators (for voltage-source drivers) and Parallel Switch Modulators (for current-source drivers).

2. VLC Driver Structures

The VLC LED driver has a dual-purpose structure for lighting and communication. It starts with the input source, either DC or AC. For AC, a Power Factor Correction (PFC) stage is added to create a DC bus. Then, a Power Conditioning (PC) stage regulates LED current and filters ripple. The final stage is the Modulator for Communication (MC), which adds data signal. This stage can be integrated with the PC or be separate. The overall design depends on factors like input type, efficiency, cost, modulation and data rate.

CONCLUSION

This article presented a comprehensive review of LED drivers and related technologies. It also discussed commonly used DC-supplied LED drivers and both single-phase and three-phase AC-supplied LED drivers, including switched-mode, single-stage, two-stage, integrated and parallel drivers. Moreover, the main advantages of each topology were highlighted. The article also proposed a classification of LED driver topologies that facilitate comparison among them and helps researchers and engineers select the best topology for each application. Moreover, the different types of controls for LED drivers were deeply discussed, illustrating their advantages and disadvantages. We also looked at the up-to-date LED driver technology of VLC, explaining what it aims for, how to implement it and its modulation and driver structure. Finally, LED driver trends were analyzed, such as high efficiency, high power density, high reliability, a longer lifetime, an electrolytic capacitorless feature, power redundance processing and magnetic integration, among others.

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Dynamic Illumination for Greater Safety and Visual Comfort in Tunnel Lighting

Continuing from an earlier article on the subject, this article addresses quality parameters and the dynamic nature of Illumination in tunnels and how to achieve them

Visual performance standards for a motorist while approaching, entering, and exiting the Tunnel must be ensured. Tunnel illumination should make the journey more comfortable for the traveller by balancing it with the natural light outside the tunnel.

CRITICAL DESIGN CRITERIA

Lighting Level

The lighting parameter considered for Tunnels is 'Luminance' unlike other applications. The 'Luminance' levels in all the zones should be calculated and provided using an appropriate luminaire, meeting other Quality parameters.

Luminance is a Vector quantity whose value varies depending on the viewing location. Luminance levels for both the road and the 'Tunnel Walls' should be assessed as seen by the motorist. For calculating purposes, observer position must be defined appropriately. For motorists, wall luminance is crucial since it constitutes a significant portion of the visual field, beside the road. The lower portions of walls operate as the background for the traffic, thus both the wall and the road must be regarded equally important.

The standard software, used for indoor/Outdoor applications cannot be used for carrying out calculations for tunnel lighting design.

'Luminance' should be calculated in the direction of motorist in software using a moving observer.

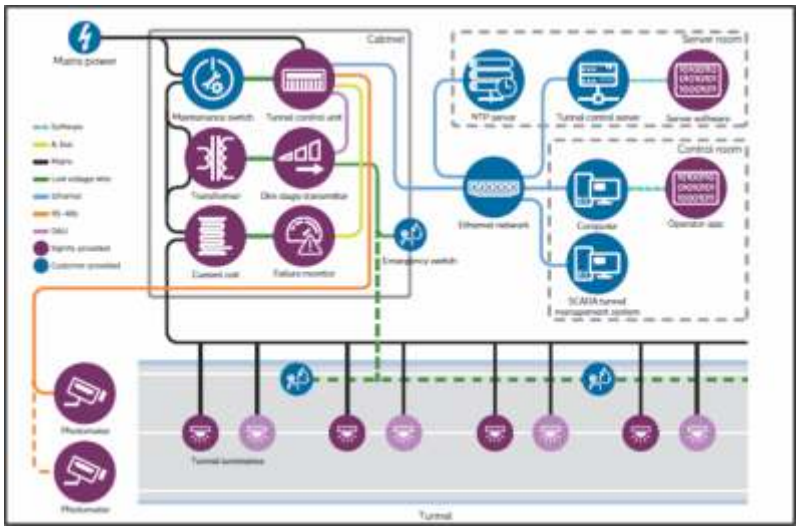
Uniformity

Good uniformity of luminance must be provided on the road surface as well as on the walls up to a height of 2m. UR (uniformity ratio) of 0.4, for Min/Avg Luminance, for both road and walls individually is recommended.

A longitudinal uniformity ratio of 0.6 along the center of each lane is recommended for the road. These values of uniformity must be achieved for all dimming steps, and various zones

Lighting of the walls and the ceiling in all zones

Tunnel walls contribute to the adaptation level and to the visual guidance. The average luminance of the tunnel walls, up to at least a height of 2 m, must be at



least 60% of the average road surface luminance at the relevant locations. Lwall / Lroad = 0.6

Glare restrictions

Glare reduces visibility, and it is important that it should be minimized. The glare measure employed in tunnel lighting is the same as that employed in road lighting, namely the threshold increment, TI. This should be less than 15 per cent for all zones, except for the exit zone during the hours of daylight. The following formula shall be used to calculate TI:

$$TI = 65\ L_v / L_{road}^{0.8} \quad if \quad L_{road} < 5\ cd/m^2$$
$$TI = 95\ L_v / L_{road}^{1.05} \quad if \quad L_{road} \geq 5\ cd/m^2$$

Street Light Software cannot be used for Tunnel lighting calculations since the Luminance Values involved here are typically > 5cd/m2

Flicker

Driving through spatially periodic fluctuations in luminance produces flicker feelings. Under some situations, the flicker may cause discomfort, which can be severe. The degree of visual discomfort caused by flicker relies on a variety of parameters, one of which is "the number of luminance changes per second (flicker frequency);". In general, the flicker impact is minimal at frequencies less than 2.5 Hz and more than 15 Hz. When the frequency is between 4 Hz and 11 Hz and the duration is greater than 20 seconds, discomfort may occur if no extra precautions are taken. It is advised that in installations lasting longer than 20 seconds, frequencies between 4 Hz and 11 Hz be avoided.

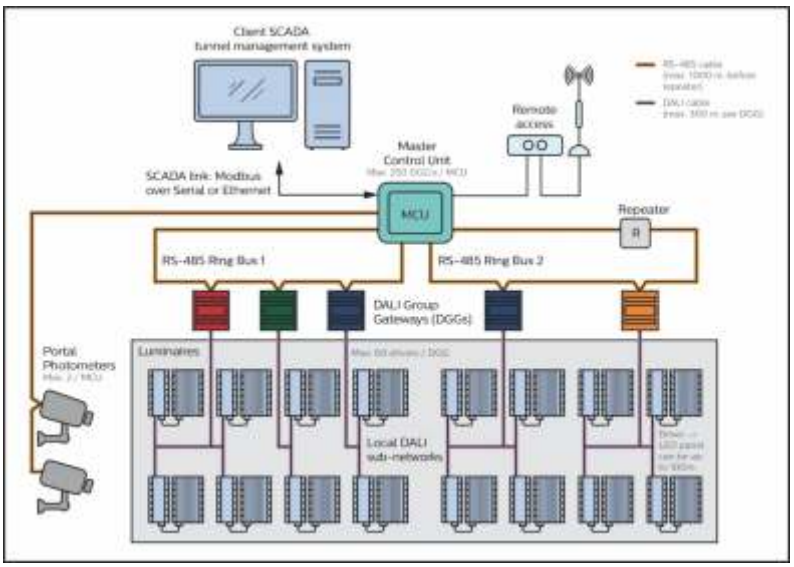
PHILHARMONIC APPROACH: BLENDING NATURAL AND ARTIFICAL LIGHT IN TUNNEL

We know that the intensity and direction of natural light vary throughout the day. It also fluctuates with variations in environmental circumstances during the day. The primary criterion for tunnel lighting is to ensure that vehicles, both day and night, may approach, pass through, and exit a tunnel at the appropriate speed while maintaining the same degree of safety and comfort as on nearby sections of open road. As a result, illumination in tunnels must also be 'Dynamic'.

This calls for 'Intelligent Lighting Systems' that will improve traffic management, save capital expenditure over the lifespan of the tunnel lighting infrastructure, and be a simple and cost-effective system to control LED tunnel lighting for both new and refurbishment projects.

Eliminating need for new separate control infrastructure, Modular system which can be standalone or driven by schedule and /or sensors can be integrated in SCADA tunnel management system for remote monitoring or control. The controls could be dimming of devices, continuous or step, or could be switching of devices in groups.

'Basic control and monitoring step dim' adaptive lighting system uses Photometer at the tunnel entrance (portal) to adjust the illumination in the tunnel to changing environment. Systems can use technology to communicate dimming signal over mains wiring and can be modular and scalable from Single bore to multi bore



tunnels.

Such system should fulfill Dynamic Lighting application requirements with fewer building blocks to meet the requirements. Depending on the complexity of the structure and use of multiple Control Units, Tunnel Control Server is employed with standard ethernet connections and photometer with high level RS 485 communication link. System architecture can be depicted as seen in figure below

System can use various components for different functions, viz. Control units + Server connectivity for Control of light, Dim stage communicator for superimposing communication signal, Unit for broadcasting signal, Failure monitoring, Surge protections, Photometer etc.

Ideal Features of Control system – Some of the important features that should be part of the system package are

- Commissioning Free Luminaires
- Manual Override Light Control
- Luminaire group failure detection
- Remote management integration for – Operational Status information, Failure warnings, alarms, Manual Stage Override, Remote Emergency override.

Control system always demand project specific control philosophy. SCADA integration interface, DGC, driver locations, interface, failsafe mode, system redundancy. Figure below depicts example of system with Master Control Unit.

SYSTEM COMPONENTS

SCADA - The Supervisory Control And Data Acquisition (SCADA) system, is a networked computer controlled system for high-level process supervisory management. The TCS (tunnel control server) and TCUs (tunnel control unit) are the interface between the SCADA system and the luminaires. The SCADA system and TCS are part of the IT system of the customer.

TCS – Tunnel Control Server - hosts an application programming interface (API) for system control and monitoring. It is also required, in case more than one TCU is used within one bore, to connect these together to create a complete system. The server is used as a commissioning tool during commissioning, and it creates service logs. It is part of the IT system of the customer.

TCU - As the name suggests, the TCU is the main control unit. Standard Ethernet is used to communicate with the NTP server and via the TC server to the SCADA system. It connects the peripherals like the photometer, failure monitor units and emergency switch together and sends a digital control signal via the CMT and transformer to the luminaire drivers. The TCU uses DALI protocol to communicate with the CMT. Automatic status monitoring of lamp, twelve level dimming to ensure that the tunnel lighting is managed as efficiently and reliably as possible. The TCU uses luminance information, received from the tunnel entrance photometers. This information is received via the RS-485 bus over ABUS, to control the CMTs in accordance with the lighting design to dim the lighting to the appropriate level. During the night, the TCU(s) will use their internal schedule to dim the lighting to the configured levels. Time information received via NTP, is used to run the scheduler.

A photometer measures the level of luminance, or brightness, created by natural light at the tunnel entrance, to ensure that the visual perception of drivers will be maintained. The output signal is used by the system to adapt the light level of the tunnel luminaires. During daytime this avoids sudden variations in lighting levels and a “black hole effect”.

SYSTEM OPERATIONS

In automatic mode, the control and monitoring system operates continuously and fully autonomously, without the requirement for any manual user intervention. With reference to the system topology, the TCU obtains portal luminance data from the photometer(s) and uses lighting design information contained in the system database to derive the required lighting levels within the tunnel. It then sets those lighting levels by sending control commands via the coded mains signals to the luminaire drivers.

The photometer-controlled tunnel lighting shall be overridden by various external interfaces with increasing levels of priority.

In case of a loss of communication between the TCU and the luminaire drivers, or any other failure conditions or power loss the lighting will go to the preprogrammed failsafe level.

Whilst controlling the lighting levels in the tunnel, the system also monitors the light degradation per outgoing power group, detect failures accurately.

The TCU generates alarms if the fault percentages exceed the configured thresholds. The system also monitors and reports the state of the photometer, failure monitor units, and the cabinet door open switch. The TCU will provide a connected SCADA system with remote control and monitoring functionality via the API running at the TCS.

The TCU hosts and runs the tunnel lighting control and monitoring software. It performs various operation and maintenance tasks: manual lighting stage control, status monitoring, report generation, data archiving etc. Most tasks can be performed while the system is running in automatic/run mode.

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Standards and Regulations

ET23 committee meeting – was held on 29th May 2025 where the following were discussed and actioned

S. No	Indian Standard	Status update
1.	Revision of IS 15885 (Part 1): 2011 Safety of Lamp Control gear Part 1 General Requirements	The adoption of IEC 61347-1: 2015 'Lamp control gear- Part 1: General and safety requirements' as Indian Standard was approved earlier but further, it was decided to adopt IEC61347-1: 2024 to revise IS 15885 (Part1): 2011 Safety of Lamp Control gear Part 1 General Requirements. The document will be circulated as P-Draft in one month period.
2.	IS 16102 (Part 1): 2012 Self – Ballasted LED Lamps for General Lighting Services Part1 Safety Requirements	In Process for Printing
3.	IS 16102 (Part 2): 2017 Self – Ballasted LED Lamps for General Lighting Services Part 2 Performance Requirements	The committee reviewed the comments received on Table 8 of ETD 23 Doc (26233), which highlighted the difficulty in measuring minimum lumen maintenance due to the minimal differences between the specified values. It was observed that minimal tolerance level like 0.4 / 0.6% will be challenging. To address this issue, it was proposed to omit the intermediate levels to widen the gap between the measured minimum lumen maintenance values. As a result, it was decided to retain the following three values for maximum life claim: a) 15,000 b) 25,000 c) 50,000 The committee approved the draft for printing
4.	IS 16103 (Part 1): 2012 LED Modules for General Lighting Part 1 Safety Requirements	Published
5.	IS 16103 (Part 2):2012 LED modules for general lighting Part 2 Performance requirements	
6.	IS 16614 (Part1) Double- Capped LED Linear Lamps Part 1 Safety Requirements	In Process for Printing
7.	IS 16614 (Part 2) Double-Capped LED Linear lamps Part 1 Performance Requirement	
8.	IS 16107 (Part 2/Sec 2): 2017	Revised draft will be submitted by ELCOMA

ETD49 committee meeting was held on 19th May 2025 where the following were discussed and actioned

S. No	Indian Standard	Status update
1.	IS 10322: Part 1, Luminaires Part 1 General Requirements and Tests (second revision)	All the revisions are approved for printing
2.	IS 10322: Part 5: Sec 1, Luminaires Part 5: Particular-requirements Section 1: Fixed general-purpose luminaires (Second Revision)	
3.	IS 10322: Part 5: Sec 2, Luminaires Part 5: Particular-requirements Section 2: Recessed luminaires and recessed air-handling luminaires (Second Revision)	
4.	IS 10322: Part 5/ Sec 3, Luminaires Part 5: Particular-requirements Section 3: Luminaires for road and street lighting (Second Revision)	
5.	IS 10322: Part 5: Sec 5, Luminaires Part 5: Particular-requirements Section 5: Floodlights (Second Revision)	
6.	IS 10322: Part 5: Sec 6, Luminaires Part 5: Particular-requirements Section 6: Hand lamps (First Revision)	
7/	IS 10322: Part 5: Sec 7, Luminaires Part 5: Particular-requirements Section 7: Lighting chains (Second Revision)	
8.	IS 10322: Part 5: Sec 8, Luminaires Part 5: Particular-requirements Section 8: Luminaires for emergency lighting (First Revision)	
9.	SP 72, (National Lighting Code)	Under revision / restructuring

BEE Star rating program

For LED Bulbs:

The Bureau of Energy Efficiency (BEE) has updated the star-rating bands for LED bulbs under its Standards & Labelling program, aligning with global trends and significant improvements in LED product efficacy. This revision supports India's commitment to achieve Net Zero by 2070 and reduce the GDP's emission intensity by 45% from its 2005 baseline. The new luminous efficacy bands for 1- to 5-star lamps, as shown in the table below, will become effective on July 1, 2026.

Star Rating Band	To be effective from 1st July-2026	To be effective from 1st July-2029
	Luminous Efficacy (lm/W)	Luminous Efficacy (lm/W)
1 Star *	≥120 and <135	≥150 and <165
2 Star **	≥135 and <150	≥165 and <180
3 Star ***	≥150 and <165	≥180 and <195
4 Star ****	≥165 and <180	≥195 and <210
5 Star *****	≥180	≥210

For TFL

No change was proposed considering that this is a declining product category with limited volumes being manufactured.

AUTHOR: SANTOSH AGNIHOTRI (CHAIRPERSON, ELCOMA TECHNICAL COMMITTEE) AND GENERAL MANAGER- QUALITY & TECHNICAL, ORIENT ELECTRIC LIMITED

Signify and BharatCares illuminate 58 Gram Panchayats in Ayodhya

Signify and BharatCares partner to illuminate 58 Gram Panchayats in Ayodhya, Uttar Pradesh, benefiting over 2.4 Lakh people under Har Gaon Roshan CSR initiative

In line with the #BrighterLivesBetterWorld vision, Signify announced a collaboration with BharatCares to bring sustainable outdoor lighting infrastructure to 58 Gram Panchayats across Uttar Pradesh under its Har Gaon Roshan CSR Program. This initiative aims to enhance safety, visibility, and the overall quality of life for people in these underserved areas, with a focus on rural communities.

The project will see the installation of 2,000 streetlights. By supporting local infrastructure development, the project will create a well-lit environment for residents, while fostering economic opportunities and improving daily life.

The letter of commitment was exchanged between District Admistration, Ayodhya and Signify in the presence of Smt. Anandiben Patel, the Hon'ble Governor of Uttar Pradesh, to further the sustainable development and community empowerment through innovative lighting solutions.

Commenting on the partnership, Vikas Malhotra, Commercial Leader, Head of Systems and Services - Signify, Greater India, said, “At Signify, we believe in bringing the best of innovations to the communities across India, through our Har Gaon Roshan CSR initiative. For this project, we are thankful for the support of BharatCares and the Hon'ble Governor of Uttar Pradesh for aiding our collective mission to strengthen rural communities. By illuminating these Gram Panchayats and installing 2,000 streetlights, we are enhancing the safety and visibility for people around these areas. This partnership reflects our commitment to using light to positively impact lives in the most underserved regions of India, fostering sustainable growth and community empowerment.”

BharatCares representative Adarsh Trivedi, added, “This partnership with Signify marks a significant step toward realizing our collective vision of transforming rural infrastructure in Uttar Pradesh. Providing lighting to these 58 Gram Panchayats will not only improve safety and infrastructure but also unlock new avenues for community development, economic growth, and enhance livelihood activities, especially during evening hours. This initiative will empower local communities and improve the overall well-being of its residents.”

As Signify continues to expand its efforts across India, the initiative stands as a testament to the company's commitment to lighting up lives, building a brighter, more inclusive tomorrow through innovation that matters.

AUTHOR: SIGNIFY INNOVATIONS INDIA LIMITED

LEDVANCE Supports Mid-Day Meal Delivery in Delhi Schools

LEDVANCE advances Social Impact by Supporting Mid-Day Meal Delivery in Delhi Schools through CSR

LEDVANCE, through its Corporate Social Responsibility (CSR) initiative, has strengthened its commitment to community welfare by partnering with The Akshaya Patra Foundation to support mid-day meal delivery in Delhi schools. Expanding on its earlier contribution of providing nutritious meals to 245 children at a government school, LEDVANCE has now donated an electric vehicle (EV) to facilitate efficient and eco-friendly meal distribution.

This initiative represents a strategic effort to address both child nutrition and environmental sustainability. The EV enables the timely delivery of freshly prepared meals to multiple schools while reducing carbon emissions, aligning with the United Nations Sustainable Development Goals of Zero Hunger and Quality Education. By ensuring students receive regular, nutritious meals, the program supports improved school attendance, concentration, and overall academic performance.

Early outcomes indicate positive shifts in attendance rates and classroom engagement, alongside enhanced equity among students. The integration of electric mobility underscores LEDVANCE's broader commitment to sustainable business practices that prioritize social impact and environmental stewardship.

Ultimately, this partnership exemplifies LEDVANCE's philosophy that corporate success should be coupled with social responsibility. By investing in sustainable, community-focused solutions, the company contributes to building a healthier, more inclusive future for underserved populations.

AUTHOR: LEDVANCE PRIVATE LIMITED

Signify launches Philips LightTheatre

Philips LightTheatre is a groundbreaking smart lighting solution designed to transform home entertainment into an unparalleled immersive experience that brings smart immersive entertainment for Indian homes ahead of the festive season

This innovative system seamlessly integrates dynamic lighting with visual and audio content, bringing movies, music, and gaming to life like never before. As consumers increasingly seek holistic entertainment solutions that go beyond the screen, the Philips Smart Entertainment Range is designed to meet this demand, offering an all-in-one solution that delivers a truly cinematic experience in the comfort of home.

The Philips LightTheatre is engineered to redefine how consumers interact with their entertainment. The system utilizes advanced Philips LightTheatre HDMI Sync Technology, which reads signals directly from video source via HDMI input, making lights dynamically respond to the colors on your TV screen for real-time accurate syncing. The system utilizes advanced Philips LightTheatre HDMI Sync Technology, which reads signals directly from any HDMI-connected device, instantly analyzes the colors and sounds, and projects ultra-accurate light effects onto the surrounding walls. Compatible with Philips gradient light bars, gradient floor light, and other Wi-Fi connected lights, creating a holistic immersive experience. This creates a captivating 'light theatre' effect that extends the on-screen action beyond the television, drawing viewers deeper into the content.

Key features of Philips LightTheatre include:

- Immersive HDMI Sync Technology: Reads HDMI signals directly, synchronizing lights with video and music in real time for dynamic effects.
- Easy Plug and Play: Simple setup with effortless integration into existing home entertainment systems.
- Multicolor Gradient Segments: Rich spectrum of customizable colors for personalized ambiance and effects.
- WiZ App Control: Full control via the intuitive WiZ app to manage settings, select light scenes, and switch between four preset sync modes - Cinematic, Vibrant, Relaxation, Rhythmic or fine-tune brightness and intensity.
- Expandable Ecosystem: The HDMI Sync Box works with any Philips Smart LED color-capable light that supports both Wi-Fi and Bluetooth. Users can link as many lights to the Sync Box as they like and make them sync with TV simultaneously.
- Voice Control Integration: Works with Google Assistant, Alexa, and Siri Shortcuts for convenient hands-free operation.

LUKER Introduces Soletro LED Solar Lights

Luker introduces SOLETRO LED Solar Lights, combining cutting-edge LED efficiency with sustainable solar power. Designed for outdoor durability and superior brightness, SOLETRO delivers reliable, eco-friendly lighting without dependency on the grid. With easy installation, zero electricity cost, and long-lasting performance, these lights are perfect for streets, gardens, Industrial and community spaces. Experience innovation that lights up the future—naturally.

Eveready launches LumaTilt and Lumaduo COB portfolio

Eveready expands its architectural lighting portfolio with the launch of two advanced COB downlight series—the LumaTilt Tiltable COB and the Lumaduo COB—covering a wattage spectrum from 3W to 30W. Powered by Chip-on-Board (COB) technology, both deliver uniform brightness, excellent color rendering, and superior energy efficiency.

The LumaTilt Tiltable COB brings versatility with a 30° swivel mechanism, ideal for accentuating artwork, architectural lines, or task-oriented spaces, while the Lumaduo COB employs a refined reflector design, offering seamless aesthetics and a graceful, even glow suited for modern interiors.

Together, these ranges exemplify Eveready's vision of illumination that elevates life beyond function. The Tiltable series embodies adaptability, allowing light to move where it is needed most, while the Lumaduo series embodies refinement, creating ambience with elegance. By uniting adaptability with design finesse, Eveready continues its mission to craft lighting solutions that inspire, endure, and transform everyday spaces into brighter, smarter, and more engaging environments.

Vasumitra Pandey appointed Vice President, ELCOMA

Mr. Vasumitra Pandey, a seasoned leader with over two decades of experience in the consumer durables and electricals sector, has been appointed as the Vice President of ELCOMA. In his concurrent role as Chief Executive Officer (CEO) of the Lighting and Consumer Durable Business at Surya Roshni Ltd, Mr. Pandey brings a wealth of industry knowledge, strategic insight, and a proven track record in scaling consumer brands and driving operational excellence.

Under his leadership, Surya Roshni continues to strengthen its position across India's dynamic lighting, fans, and home appliances markets, focusing on innovation, customer-centricity, and performance. His appointment at ELCOMA marks a significant opportunity to leverage his deep industry experience for the advancement of the electrical and lighting sector at large.

ELCOMA GB meeting Held in Delhi

The 3rd Governing Body Meeting of the year 2025 was held on 19th August 2025 at India Habitat Centre, New Delhi, which was sponsored by M/s. Havells India Ltd. 26 participants representing ELCOMA members, mostly from the GB were present in the meeting. In this meeting, Mr. Parag Bhatnagar welcomed all participants. He mentioned that the lighting industry is still going through some difficult times but in last 3-4 months, especially in the previous quarter, we are seeing signs of improvement. With inflation coming down and with festive season coming, we expect to have a great Q2 for lighting.

Mr. Bhatnagar announced the resignation of Mr. Jitendra Agarwal from Surya and therefore from ELCOMA Board. During the ELCOMA Board meeting, it was decided that going by the precedence where the company's senior representative usually replaces exiting board member, Mr. Vasumitra Pandey, presently CEO at Surya, would become Vice-President in the ELCOMA Board with immediate effect. Mr. Bhatnagar then formally proceeded to start the meeting, after reading the minutes of the previous Governing Body meeting held on 3rd June 2025, which was approved. After the President's address, Mr. Amal Sengupta, Secretary General of ELCOMA read out Secretary General's points to the GB. The committee reports were presented by Mr. Nitish Poonia and Mr. Santosh Agnihotri.

The meeting came to an end with a vote of thanks by the President, Mr. Parag Bhatnagar. Mr. Amit Mittal of Lightanium Technologies Private Limited offered to sponsor the next GB/AGM, which will be held in New Delhi in November 2025.

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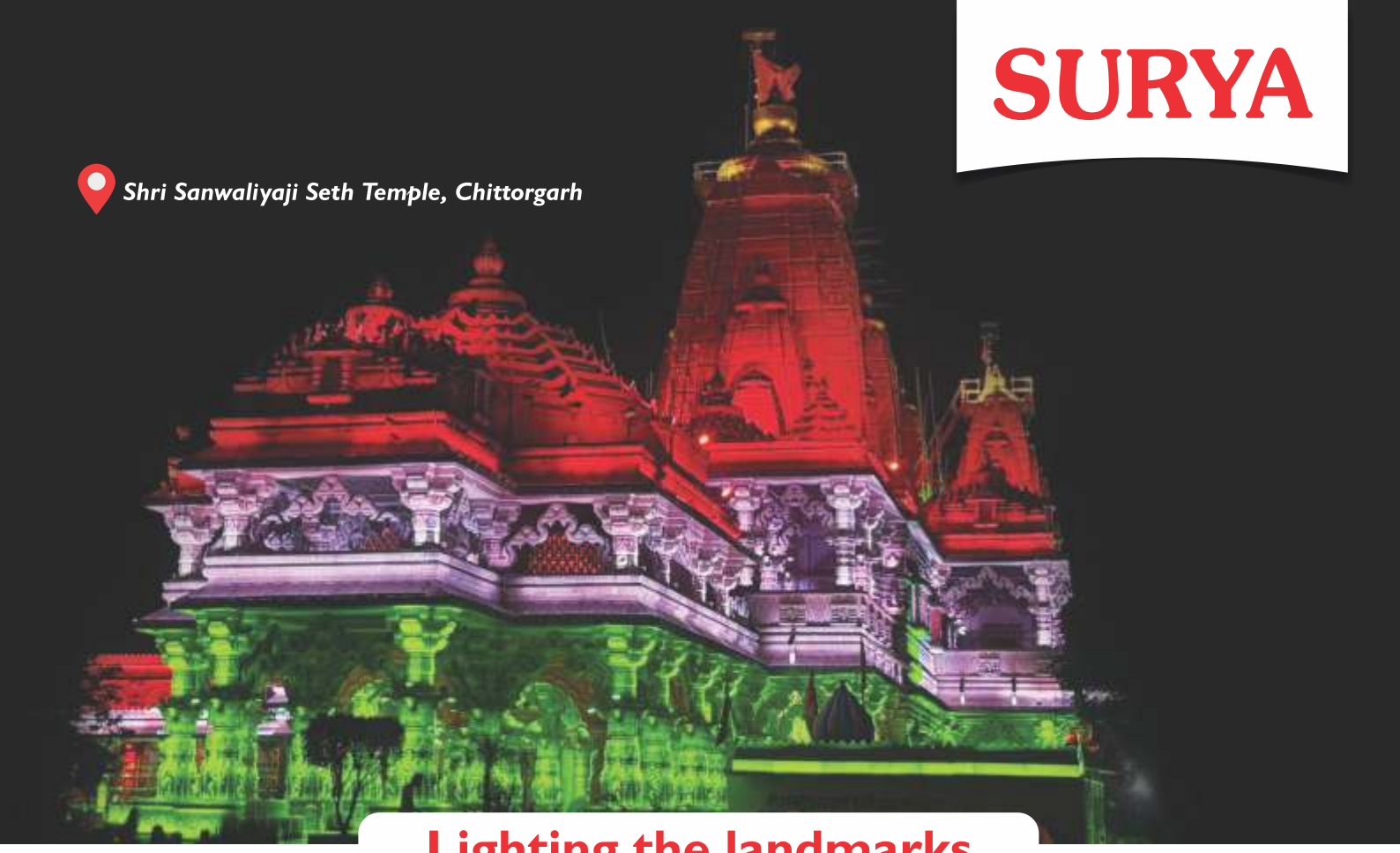

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