

# IES Nashville Section Virtual Meeting

Date: October 23, 2024,  
11:30 am – 1:00 pm

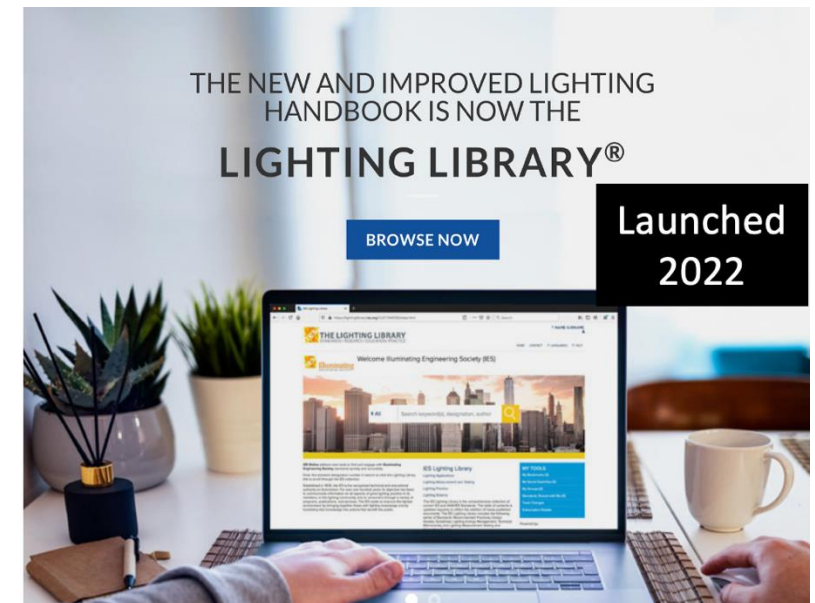
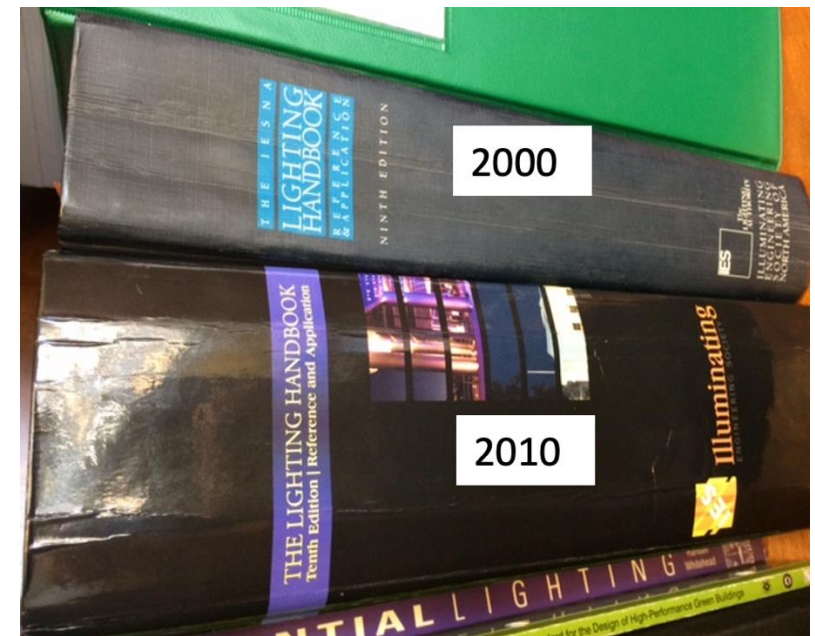
Topic: Lighting Progress 2024



Mark Lien  
LC, C-GUVMP, CLMC, CLEP, HBDP, LEED AP



IES Industry Relations Consultant / President, Augmented Illumination  
[mlien@ies.org](mailto:mlien@ies.org)



# History Provides Perspective

The further into the future you want to see, the more important it is to look to the past.

-Winston Churchill



*The Roaring Lion*, 1941

**Prime Minister of the United Kingdom**

“arc lamp life has been increased to over 100 hours”

- 1911 IES Archives

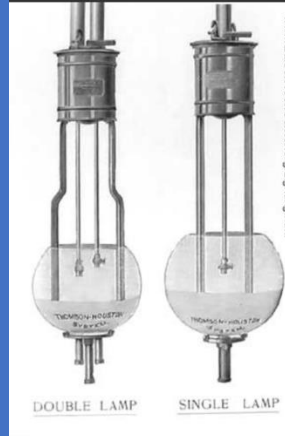


## The First Form of Electric Light History of the Carbon Arc Lamp (1800 - 1980s)

All credits and sources are located at the bottom of each lighting page

- Introduction & Statistics
- How They Work
- Inventors and Developments

- Design Variations
- Timeline
- Modern Day Ancestor: Xenon Arc Lamp



The carbon arc lamp was the first widely-used type of electric light and the first commercially successful form of electric lamp.

Unlike the rest of the types of lighting described in our [Electric Lighting](#) pages, the arc light's development had to coincide with basic power generation developments. As batteries, generators and power conditioning technology developed arc lamps could be made more sophisticated. The carbon rod was often replaced by magnetite (iron ore) for longer life by 1905. The carbon arc lamp led to other arc discharge lamps like the [mercury vapor](#), [sodium](#) and [fluorescent](#) lamps. Today the lamp has been replaced by the [xenon short-arc lamp](#).

*Left: Two arc lamps: single and double arc lamp designed by Elihu Thomson and E.W. Rice for the Thomson-Houston Electric Company 1880s*

### Carbon Arc Lamp: Advantages:

- Super bright light, capable of lighting a large length of street or a large factory interior
- Was the ONLY electric light available to light large areas from 1800 - 1901
- Was cheaper to light streets with the arc lamp than gas or oil lamps

### Disadvantages:

- Carbon rods had to be replaced after a short period of time, this became a full time job in a city
- Produces dangerous UV-A, UV-B, and UV-C rays
- Created a buzzing sound and flickering as the light burned
- Created large amounts of RFI (radio frequency interference)
- Dangerous: it was a fire hazard, many theaters burned as a result of the excessive heat or sparks emitted, also the unenclosed lamp could easily electrocute or severely burn technicians.
- Carbon Monoxide emissions (bad for indoor use!) It only worked in the past because buildings were poorly insulated and fresh air could enter. Some of today's energy efficient buildings are almost air tight.

2-7 lumens per watt, brighter than the early incandescent lamps – used for streetlighting and large indoor applications.

<https://edisontechcenter.org/ArcLamps.html>

“the firefly is being researched to try and mimic their efficiency of light output”

- 1913 IES Archives



**IES**  
**100**  
1906-2006

## The French town where the lighting is alive

In a tranquil side room of the Covid-19 vaccination centre in Rambouillet, a small French town around 30 miles (50km) south-west of Paris, a soft blue light emanated from a row of cylindrical tubes. Members of the public who received a vaccine last year were invited to bathe in the glow for a few minutes while they waited in the recovery area.

Soon, the same azure glow will illuminate the nearby, tree-lined Place André Thomé et Jacqueline Thomé-Patenôtre, located just across from the aptly named La Lanterne performance hall, at night. These ethereal experiments are also underway across France, including at the capital's Roissy-Charles-de-Gaulle airport.

But unlike standard streetlamps, which often emit a harsh glare and need to be hooked up to the electricity grid, these otherworldly lights are powered by living organisms through a process known as bioluminescence.

**B B C****FUTURE**

flashlights being mass marketed  
to police and general public

- 1918 IES Archives



“lightless nights” being researched to become standard practice even after wartime to conserve energy

- 1919 IES Archives

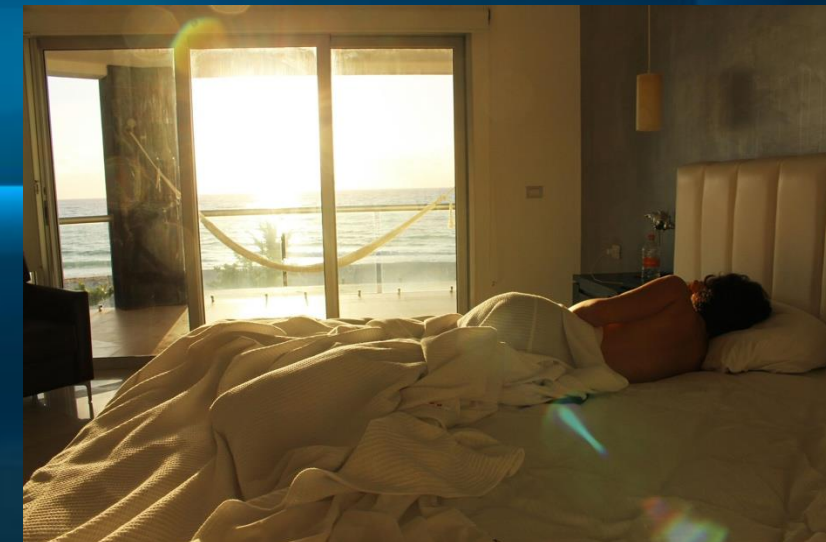


YOUR HEALTH

**Sleeping with even a little bit of light isn't good for your health, study shows**

APRIL 1, 2022 · 5:00 AM ET

By Will Stone

The NPR logo, consisting of the letters 'n', 'p', and 'r' in white, each inside a colored square (red, black, and blue respectively).

“it has been recommended that department store lighting should be 4 to 10 foot-candles” - 1921 IES Archives

(43 to 107 Lux)

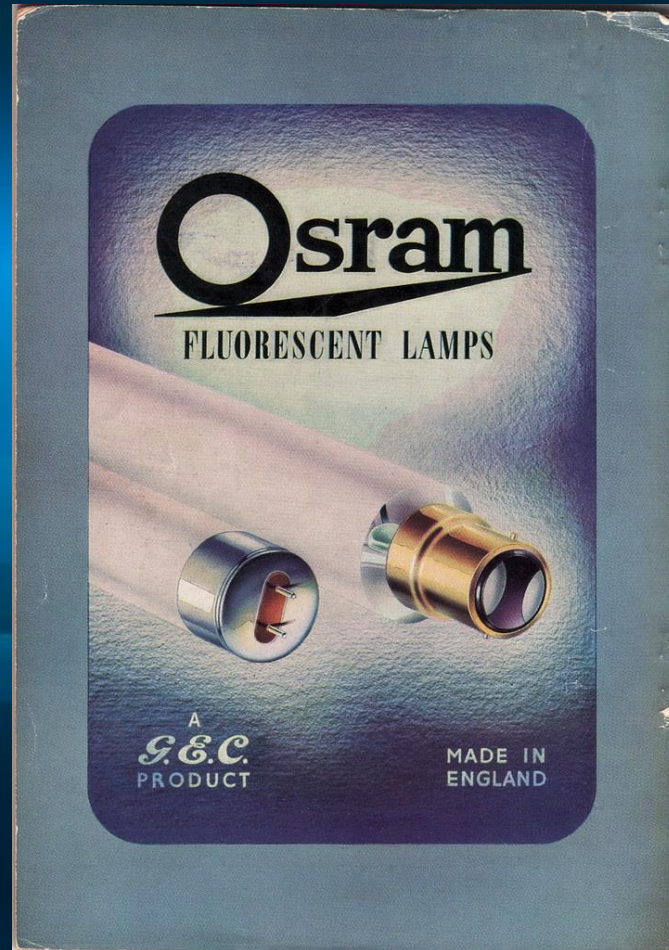


**IES**  
**100**  
1906-2006



“fluorescent lamps have reached or exceeded 60 lumens per watt...and lives attaining at least 7,000 hours”

- 1949 IES Archives



**IES**  
**100**  
1906-2006

“A factory with 150 footcandles of general illumination is reported and trial installations of 1000 footcandles are being studied”

- 1956 IES Archives

(1614 Lux)

(10,763 Lux)



**IES**  
**100**  
1906-2006

An application in a utility company's executive office was shown with 425 footcandles (4574 Lux)

- 1957 IES Archives

**IES**  
**100**  
1906-2006



“A combination of incandescent and fluorescent lighting provides 300 footcandles for high-speed merchandising in a supermarket” (3229 Lux)

- 1959 IES Archives



the LED light source

- 1967 IES Archives



Panel de calibre digital LED 1967-1972 Chevy Truck



**IES**  
**100**  
1906-2006

new advances in revolving light balls and illuminated colored viscous fluid abound with the lighting industry starting the disco era

- 1972 History of Disco Archives



the first computer aided lighting  
design programs unveiled



- 1982 IES Archives

**IES**  
**100**  
1906-2006

# *Progress Report Analysis 2024*

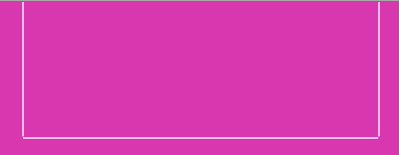




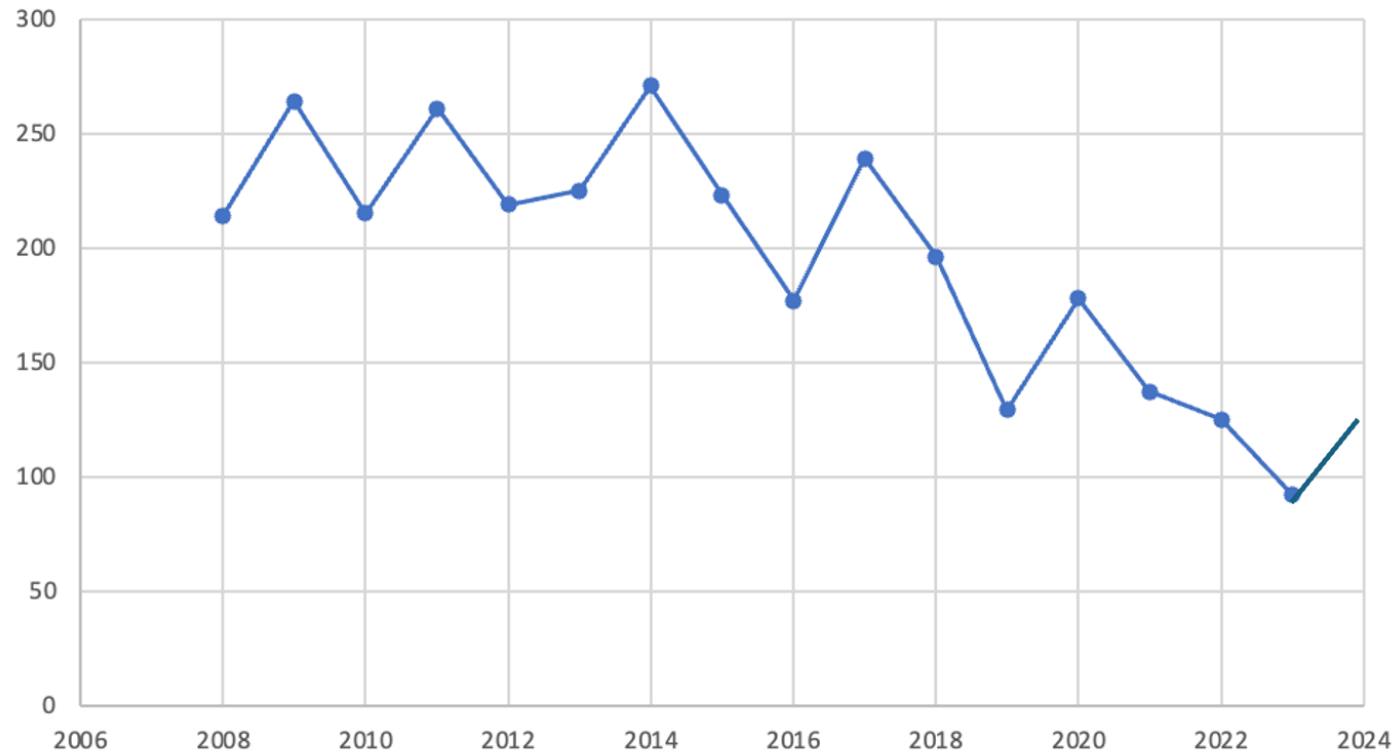
# 2024 by Categories

- Categories were increasing but are retracting now. We are in an LED world for the foreseeable future.
- 2024 does not include non-LED sources or luminaires, material advancements or solar products.
- Two horticulture and nine circadian & health related submissions were accepted, and we accepted our first AI product.

Submission Breakdown:				
Code	Type		No.	Percent
HS	Historical Sources		0	0.0%
LS	LED Sources		16	12.9%
FB	Fluorescent Ballasts		0	0.0%
SO	Solar		0	0.0%
EM	Life Safety		4	3.2%
CO	Controls		11	8.9%
AC	Accessory		4	3.2%
FL	Fluorescent Fixtures		0	0.0%
LL	LED Fixtures		77	62.1%
RE	Research		2	1.6%
PU	Publications		4	3.2%
MA	Materials		0	0.0%
DT	Design Tools		3	2.4%
PS	Pwr Supply		0	0.0%
SY	Lighting Syst		3	2.4%
			124	100.0%



## Submission Counts by Year



**2023 = LOWEST  
SUBMITTAL COUNT**

**2024 SUBMISSIONS  
=124, UP FROM 92**

**LIGHTING  
INNOVATION IN  
DECLINE?**



# 10 Year Comparison

20 categories a decade ago and 15 now (14 used in 2014 vs. 9 now)

265 Submissions in 2014, 124 now

LED sources fell from 35 to 16

LED Fixtures fell from 162 to 77

Design tools (software, etc) from 9 to 3

Controls from 16 to 11

Submission Breakdown:			
Code	Type	No.	Percent
IS	Inc Sources	0	0.0%
FS	Fluorescent Sources	3	1.1%
MS	Metal Halide Sources	0	0.0%
SS	HPS Sources	1	0.4%
LS	LED Sources	35	13.2%
HB	HID Ballasts	1	0.4%
FB	Fluorescent Ballasts	0	0.0%
LD	LED Drivers	9	3.4%
EM	Emergency	1	0.4%
EL	Emergency LED	0	0.0%
CO	Controls	16	6.0%
AC	Accessory	17	6.4%
FL	Fluorescent Fixtures	0	0.0%
ML	Metal Halide Fixtures	0	0.0%
LL	LED Fixtures	162	61.1%
RE	Research	2	0.8%
PU	Publications	8	3.0%
MA	Materials	5	1.9%
DT	Design Tools	4	1.5%
DL	Daylighting	1	0.4%
		265	100.0%

2014

Submission Breakdown:				
Code	Type		No.	Percent
HS	Historical Sources		0	0.0%
LS	LED Sources		16	12.9%
FB	Fluorescent Ballasts		0	0.0%
SO	Solar		0	0.0%
EM	Life Safety		4	3.2%
CO	Controls		11	8.9%
AC	Accessory		4	3.2%
FL	Fluorescent Fixtures		0	0.0%
LL	LED Fixtures		77	62.1%
RE	Research		2	1.6%
PU	Publications		4	3.2%
MA	Materials		0	0.0%
DT	Design Tools		3	2.4%
PS	Pwr Supply		0	0.0%
SY	Lighting Syst		3	2.4%
			124	100.0%

2024

# Multiple 2024 Progress Report Recognitions

◦ RAB	14	Meteor	2
◦ Signify	14	Zaniboni	2
◦ Cooper Lighting	12		
◦ Genlyte/Ledalite	1	LEDVANCE	2
◦ Bodine	1		
◦ Green Creative	7		
◦ Acuity Brands	7		
◦ Juno	1		
◦ Gotham	1		
◦ Lithonia	1		
◦ IOTA	1		
◦ Hydrel	1		
◦ A-Light	1		
◦ Cyclone	1		
◦ IES	4		
◦ Kirlin	3		
◦ mwconnect	3		
◦ Lumileds	2		
◦ Legrand (Kenall)	2		



# Reasons for Acceptance

- New feature/combination of features 40
- CCT selectable/tunable 29
- Highest efficacy 16
- Smallest size for product type 11



**“Happiness can only exist in acceptance.”**

**~George Orwell**

# Reasons for Acceptance

- Hazardous Location 4
- Publications (IES) 4
- 3D/Sustainability 4
- Highest lumen/CBCP output for type 3
- Retrofit Lamps 2



**“Happiness can only exist in acceptance.”**

**~George Orwell**



# HELLO

my name is



- Blue Iris Labs
- Light Engine Tech.
- Lightart
- LUUM.iO
- Lumenture
- Mwconnect
- SGM Light
- Specialty Lighting Ind.
- Starco

# *Progress Report Analysis 2024*

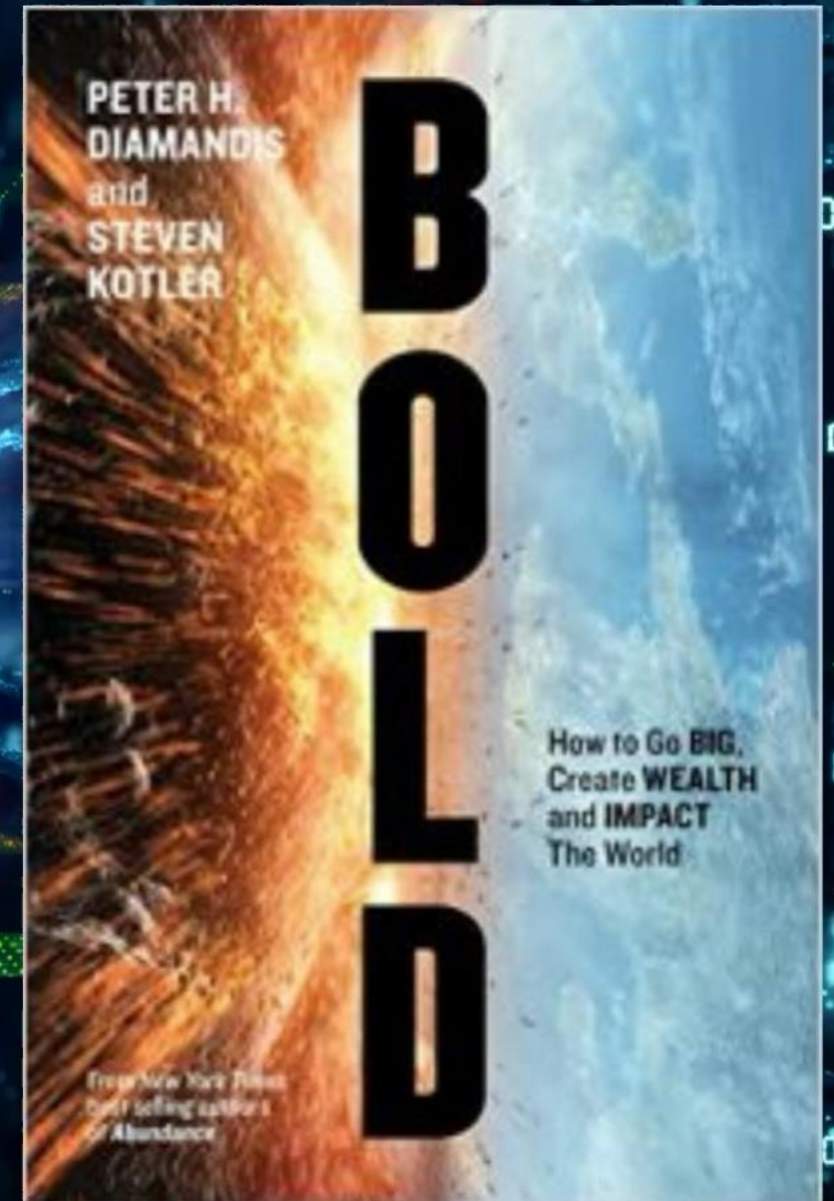




# STAGES OF DIGITAL TECHNOLOGIES

## The 6 D's (Hallmarks of Exponential Growth)

- Digitalization
- Deception/Hype Cycle
- Disruption
- Demonetization
- Dematerialization
- Democratization



**2024 PROGRESS REPORT**

2024













INDUSTRY  
**PROGRESS  
REPORT**

SELECTION

**ACCEPTED PRODUCTS**

SEQ # VISUAL ITEM NAME / Significance / Submittal Number / CONTACT INFORMATION

LED CHIPS AND MODULES			
1		<b>Luxeon HL4X LEDs</b> <i>Efficacy gain of 10%</i>  Submittal #65	Willem Sillevs Smitt Lumileds 370 W. Trimble Rd. San Jose, CA 95131 willem.sillevs-smitt@lumileds.com
2		<b>NightScape Technology</b> <i>Amber with reduced blue content</i>  Submittal #66	Willem Sillevs Smitt Lumileds 370 W. Trimble Rd. San Jose, CA 95131 willem.sillevs-smitt@lumileds.com
3		<b>Bianco LED</b> <i>AC input LED modules</i>  Submittal #111	Marc McAndrew ERP Power LLC 2625 Townsgate Road, Suite 106 Westlake Village, CA 91361 marc@erp-power.com
LED REPLACEMENT LAMPS			
4		<b>FlexDuo Tape Light</b> <i>Tape with two output levels</i>  Submittal #101	Alexander Nicolaidis Scout Lighting 85 Washington Ave. Mineola, NY 11501 alex@scoutlighting.com
5		<b>CCT Select A21 Lamp</b> <i>Integral surge protection</i>  Submittal #7	Devin Jernigan GREEN CREATIVE 224 McCraney Loop Sanford, FL 32771 djernigan@ILLUMUS.com
6		<b>Power and CCT Select HID Replacement Lamps</b> <i>Power and CCT field selectable</i>  Submittal #8	Devin Jernigan GREEN CREATIVE 224 McCraney Loop Sanford, FL 32771 djernigan@ILLUMUS.com
7		<b>CCT Select Filament LED Lamps</b> <i>Field selectable CCT and output filament lamp</i>  Submittal #9	Devin Jernigan GREEN CREATIVE 224 McCraney Loop Sanford, FL 32771 djernigan@ILLUMUS.com
8		<b>Universal CCT Select Emergency Tube</b> <i>UL 924 lock-in socket</i>  Submittal #10	Devin Jernigan GREEN CREATIVE 224 McCraney Loop Sanford, FL 32771 djernigan@ILLUMUS.com
9		<b>75W Incandescent Equivalence CCT Select A19 Lamp</b> <i>Highest efficacy 75-watt replacement</i>  Submittal #11	Devin Jernigan GREEN CREATIVE 224 McCraney Loop Sanford, FL 32771 djernigan@ILLUMUS.com
10		<b>120-277V Universal Voltage CCT Select A19 Lamp</b> <i>First universal voltage 60W replacement with dimming and CCT selection</i>  Submittal #12	Devin Jernigan GREEN CREATIVE 224 McCraney Loop Sanford, FL 32771 djernigan@ILLUMUS.com

# Energy-saving LEDs 'will not save energy', say boffins

**Photon-hoggish humanity set for orgy of illumination**

By Lewis Page,

<http://iopscience.iop.org/0022-3727/43/35/354001>



**"Presented with the availability of cheaper light, humans may use more of it, as has happened over recent centuries with remarkable consistency following other lighting innovations,"** says Jeff Tsao of the Sandia National Laboratory. "That is, rather than functioning as an instrument of decreased energy use, LEDs may be instead the next step in increasing human productivity and quality of life."

According to Tsao and his colleagues at Sandia, the fraction of gross domestic product spent on lighting has remained constant as candles were replaced by oil lamps, then again in the transition to the gaslight era, then yet again with the arrival of electric lighting. What changed with each of these innovations was that lighting became more and more common.



**"Over the past three centuries, according to well-accepted studies from a range of sources, the world has spent about 0.72 percent of the world's per capita gross domestic product on artificial lighting,"** says Tsao. "This is so for England in 1700, in the underdeveloped world not on the grid and in the developed world using the most advanced lighting technologies. There may be little reason to expect a different future response from our species."

SEQ #	VISUAL	ITEM NAME / <i>Significance</i> / Submittal Number / CONTACT INFORMATION
11		<b>CCT Select and Tunable White T8 EXT</b> Bluetooth 50K hours and tunable white Submittal #16 Devin Jernigan GREEN CREATIVE 224 McCraney Loop Sanford, FL 32771 djernigan@ILLUMUS.com
12		<b>T-8 8-foot Field-Adjustable Retrofit Lamp</b> <i>Field adjustable with interchangeable base</i> Submittal #36 Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
13		<b>T8 Type B SmartShirt Lamp</b> <i>Microwave sensor and tunable white</i> Submittal #42
14		<b>ED18 LED Replacement Lamps</b> <i>Actual E18 size 400W replacement</i> Submittal #62 Natalie Kersker Current 25825 Science Park Dr. Beachwood, OH 44122 natalie.kersker@currentlighting.com
<b>LUMINAIRES - DOWNLIGHTS</b>		
15		<b>NU Pro 1-inch Downlight</b> <i>Tunable white and CCT in a 1-inch downlight</i> Submittal #22 Jesse Poggio LEDRAbrands 88 Maxwell Irvine, CA 92618 jessep@ledrbrands.com
16		<b>2-inch Canless Wafer Downlight</b> <i>2-inch selectable CCT and lumens</i> Submittal #29 Darcie Callison Acuity Brands 1400 Lester Road Conyers, GA 30012 darcie.callison@acuitybrands.com
17		<b>Fire-Resistant Wafer Downlight</b> <i>Highest efficacy fire-rated wafer</i> Submittal #38 Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
18		<b>Ambient+ Luminaire</b> <i>Six color remotely-selected downlight</i> Submittal #59 Amanda Schaneman Kirlin Lighting 3401 E Jefferson Ave. Detroit, MI 48207 aschaneman@kirlinlighting.com
19		<b>HCD468 Pro Series Downlight</b> <i>Family of canless downlights including snap-in wallwash</i> Submittal #74 Mike Lunn Cooper Lighting Solutions 1121 Highway 74 South Peachtree City, GA 30269 michael.lunn@cooperlighting.com
20		<b>LCR 2.0 Downlight</b> <i>Highest output round can light; wall wash and downlight in same form factor</i> Submittal #88 Mike Lunn Cooper Lighting Solutions 1121 Highway 74 South Peachtree City, GA 30269 michael.lunn@cooperlighting.com
21		<b>IVO Recessed Downlight</b> <i>Shallowest 4-inch recessed downlight</i> Submittal #96 Lily Willis Acuity Brands 1331 Briarwood Dr. NE Atlanta, GA 30306 lily.willis@acuitybrands.com



Microwave sensor uses Doppler radar to spot crawling, walking and running even outdoors. It is especially useful for security. It clams to differentiate intruders from passerbys.

SEQ #	VISUAL	ITEM NAME / Significance / Submittal Number /	CONTACT INFORMATION
22		<b>Portfolio Performance</b> <i>High center-beam candlepower with Melanopic lighting</i> Submittal #99	Cheryl Fabian Cooper Lighting Solutions 1121 Hwy 74 S. Peachtree City, GA 30269 cheryl.fabian@cooperLighting.com
23		<b>Mini TX Downlight</b> <i>Wood and stone mounting</i> Submittal #105	Darin Fowler Zaniboni Lightng 101 North Garden Avenue Clearwater, FL 33755 specdev@zanibonilighting.com
24		<b>X-Series Downlighting</b> <i>Fully integrated DALI 2 driver</i> Submittal #110	Samatha Orzel DMF Lighting 1118 East 223rd Street Carson, CA 90745 sorzel@dmflighting.com
<b>HORTICULTURAL</b>			
25		<b>SLGL R&amp;D LED Grow Light</b> <i>Integral AI camera to monitor plant growth</i> Submittal #6	Jason Bao Starco Lighting Inc. 2495 Main Street, Suite #218 Buffalo, NY 14214 jason@starcous.com
26		<b>Firefly PXL Horticultural Luminaire</b> <i>First pulsed output xenon grow light</i> Submittal #51	Craig Satterfield Neotek, Inc. P.O. Box 1540, 1030 Dividend Road Midlothian, TX 76065 craig@neoteklighting.com
<b>MEDICAL</b>			
27		<b>MRI GRBW Downlights</b> <i>First RGBW MRI downlight</i> Submittal #73	Amanda Schaneman Kirlin Lighting 3401 E Jefferson Ave. Detroit, MI 48207 aschaneman@kirlinlighting.com
28		<b>Circadian Sky Luminaire</b> <i>High melanopic ratio at 2,200 to 40,000K</i> Submittal #85	Atlas Rahmani Innerscene 548 Market Street, #40123 San Francisco, CA 94014 sales@innerscene.com
29		<b>MedMaster BHRT</b> <i>Only IP and NSF rated product in this form with Indigo clean</i> Submittal #100	Joanne Cummins Kenall Manufacturing 10200 55th Street Kenosha, WI 53144 joanne.cummins@kenall.com
30		<b>M3X3L9-265-275 Module Series</b> <i>Highest power GUV LEDs under one lens</i> Submittal #94	Saya Han Violumas, Inc. 1001 Fulton Pl. Fremont, CA 94539 saya@violumas.com
<b>LINEAR</b>			
31		<b>RTLED Adjustable Troffer</b> <i>Field-adjustable troffer with microwave sensor</i> Submittal #43	Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com



Images captured by the cameras will be processed by AI algorithm to detect plant disease.



# “AI and its impacts could prove even bigger than the industrial revolution”

Some jobs will undoubtedly disappear, the bank Goldman Sachs suggested an almost incomprehensible **300m roles could be lost** or diminished by the advancing technology.

While no one wants to be replaced by a robot, Mostaque's hope is that better jobs could be created because "productivity increases will balance out" and humans can concentrate on the things that make us human, and let machines do more of the rest. He agrees with the UK's former chief scientific advisor, Sir Patrick Vallance, that the advance of AI and its impacts could prove even bigger than the industrial revolution.

**Scary Smart**



Mo Gawdat

**Mo points out, by 2049 AI is predicted to be 1 billion times smarter than the smartest human**

The Ascent  
of Information  
Books, Bits, Genes,  
Machines, and Lives  
Unending Algorithm  
Caleb Scharf

A 2016 study by the semiconductor industry produced a roadmap that forecasted that by 2040 the world's computer chips will demand more electricity than is expected to be produced globally at that time.

***“Artificial intelligence could have more profound implications for humanity than electricity or fire.” - Sundar Pichai, CEO, Alphabet***

***“Companies have to race to build AI or they will be made uncompetitive. Essentially, if your competitor is racing to build AI, they will crush you.” - Elon Musk***

AI Is About to Boost Power Bil...  
www.wsj.com

WSJ

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# AI Is About to Boost Power Bills—Who'll Take Heat for That?

High prices are a windfall for power-plant owners but are starting to raise difficult questions

By [Jinjoo Lee](#) [Follow](#)  
Aug. 12, 2024 at 7:00 am ET

IMF proposes 85% power tax...  
cryptoslate.com

Passkeys Wallet Try Passkeys Today

NEWS es crypto salaries in landmark court ruling • Tr

News > [Bitcoin](#) > [Mining](#)

# IMF proposes 85% power tax hike on crypto and AI data centers

IMF warned that crypto miners and data centers could be consuming more than 3% of the world's energy within the next three years.

[X](#) [Telegram](#) [LinkedIn](#) [Email](#)

Oluwapelumi Adejumo  
Aug. 16, 2024  
at 12:30 pm UTC

AI's growing power demands could tr...  
www.thestreet.com

TheStreet Roundtable

HOME > [CRYPTO](#) > [INNOVATION](#)

# AI's growing power demands could trigger a global energy crisis

As AI technology grows, the need for robust digital infrastructure and energy resources becomes increasingly pressing.

ROB NELSON • AUG 13, 2024 10:37 AM EDT

yahoo/finance

# AI's insatiable energy demand is going nuclear

Rachelle Akuffo • Host  
Sun, Aug 25, 2024 at 10:32 AM EDT • 7 min read

In This Article:

[META -1.42%](#) [GOOG +0.49%](#) [MSFT -0.80%](#) [AMZN -0.75%](#) [TSM -1](#)

Amazon (AMZN) is ubiquitous in today's world, not just for being one of the biggest and most established online marketplaces but also for being among the largest data center providers.

What Amazon is far less known for is being the owner and operator of nuclear power plants.

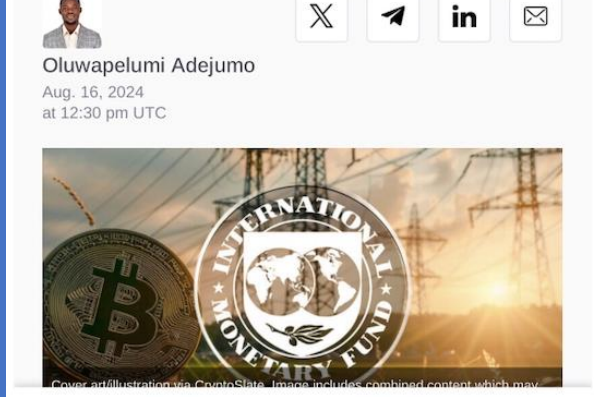
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DIVE BRIEF

# US electricity prices rise again as AI, onshoring may mean decades of power demand growth: BofA

The year-over-year inflation rate for electricity prices reached 5.9% in May, up from 3.8% in January, according to Bank of America Institute.

Published July 8, 2024



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# Artificial intelligence needs so much power it's overwhelming the electrical grid

By [The Conversation](#)  
Research led by Ayse Coskun, Boston University  
Jul 14, 2024

TECHNOLOGY

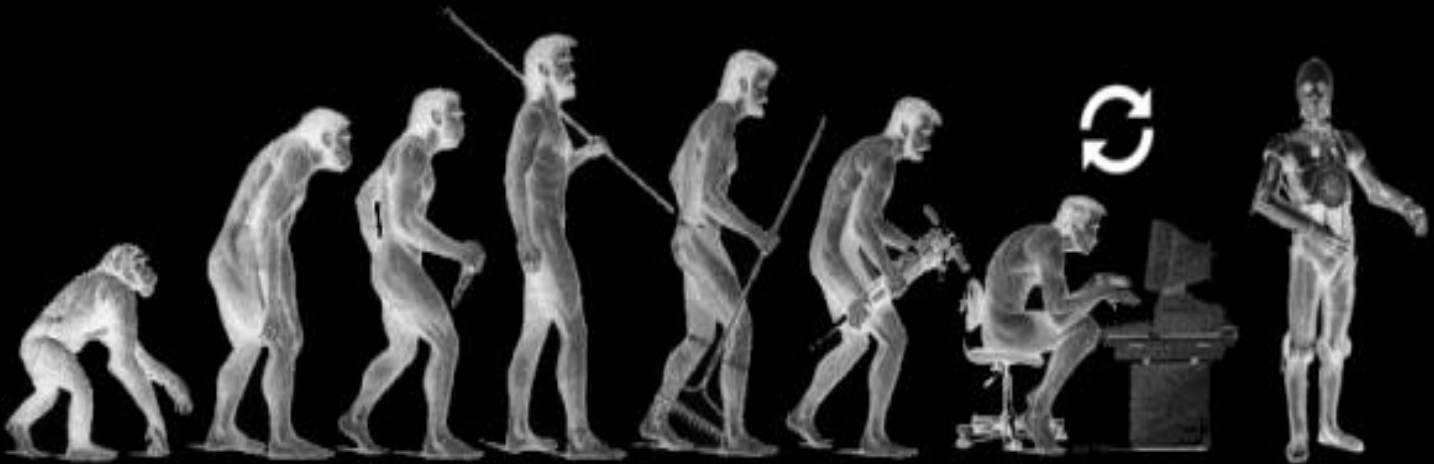
# Elon Musk: AI will run out of electricity and transformers in 2025

By Loz Blain  
March 01, 2024

<https://newatlas.com/technology/elon-musk-ai/>

NEW ATLAS [f](#) [t](#) [v](#) [in](#)





MIT EmTech Digital May 2-3, 2023



“I think it’s quite conceivable that humanity is just a passing phase in the evolution of intelligence,” Hinton said.



“AI Could One Day Engineer a Pandemic, Experts Warn”

<https://time.com/7014800/ai-pandemic-bioterrorism/>



**MICROSOFT & OPENAI'S \$100B AI SUPERCOMPUTER 'STARGATE' WOULD BE POWERED BY SEVERAL NUCLEAR POWERPLANTS**

**Brown:** What about the idea that human beings die and are mortal, whereas AI doesn't? And so AIs do not have the quickened, tragic sense of existence humans have, no matter how much AI can think and accomplish?

**Hinton:** That's certainly all true. We are mortal and they are not. But you have to be careful what you mean by immortality. The machines need our world to make the machine that they run on. If they start to do that for themselves, we're fucked. Because they'll be much smarter than us.

**Brown:** Is that already happening?

**Hinton:** Not that they're making themselves yet, as far as we know.

**Brown:** Is that a real possibility?

**Hinton:** Almost everybody I know thinks that unless we do something to prevent it, that's what's coming.

[W https://en.wikipedia.org/wiki/Geoffrey\\_Hinton](https://en.wikipedia.org/wiki/Geoffrey_Hinton)  
**Geoffrey Hinton - Wikipedia**  
Geoffrey Everest Hinton CC FRS FRSC [12] (born 6 December 1947) is a British-Canadian cognitive psychologist and computer scientist, most noted for his work on artificial neural networks. From 2013 to 2023, he divided his time working for Google ( Google Brain) and the University of Toronto, before publicly announcing his departure from Google ...

## The Nobel Prize in Physics 2024

### Summary

### Laureates

[John Hopfield](#)

[Geoffrey Hinton](#)

[Facts](#)

[Interview](#)

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[Prize announcement](#)

[Press release](#)

[Popular information](#)

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# Geoffrey Hinton

## Facts



Ill. Niklas Elmehed © Nobel  
Prize Outreach

Geoffrey E. Hinton  
The Nobel Prize in Physics 2024

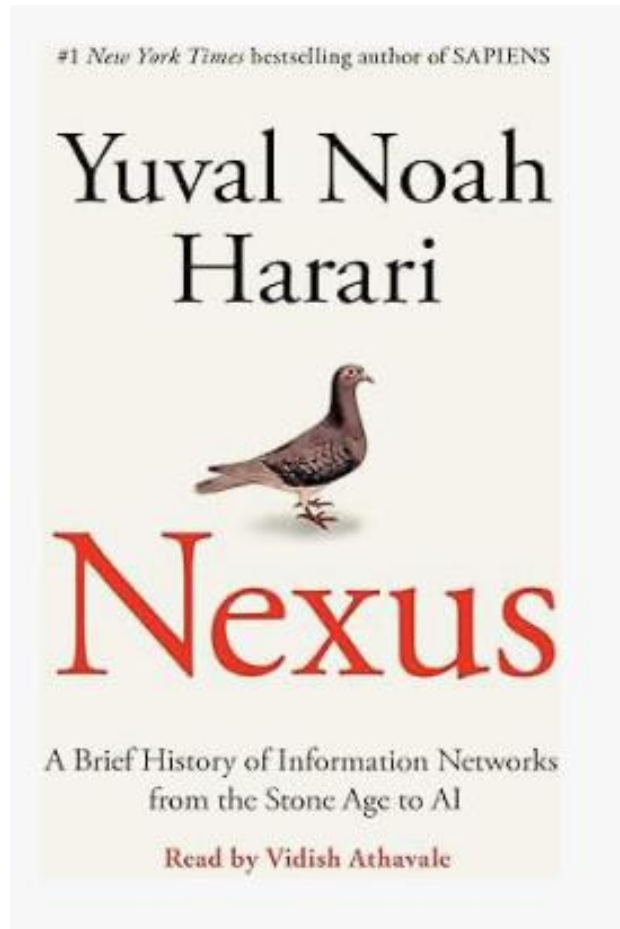
Born: 6 December 1947, London, UK

Affiliation at the time of the award: University of Toronto,  
Canada

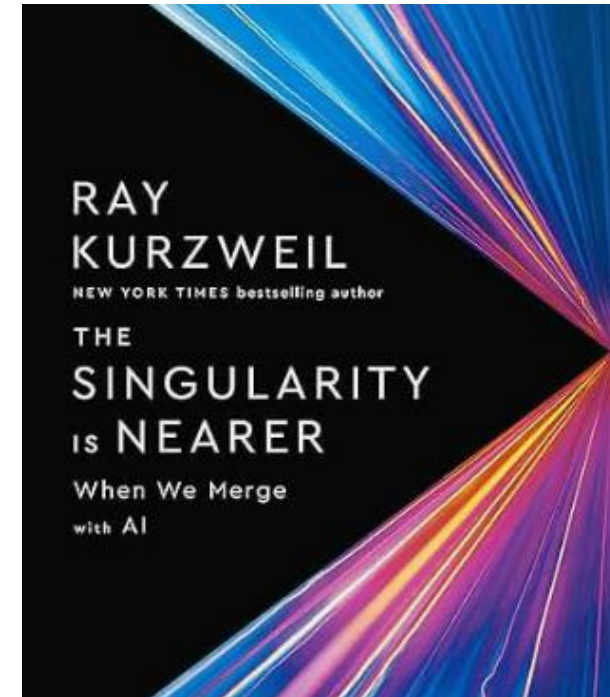
Prize motivation: “for foundational discoveries and  
inventions that enable machine learning with artificial  
neural networks”

Prize share: 1/2

# Concurrent Contradictions: Both Can Be True

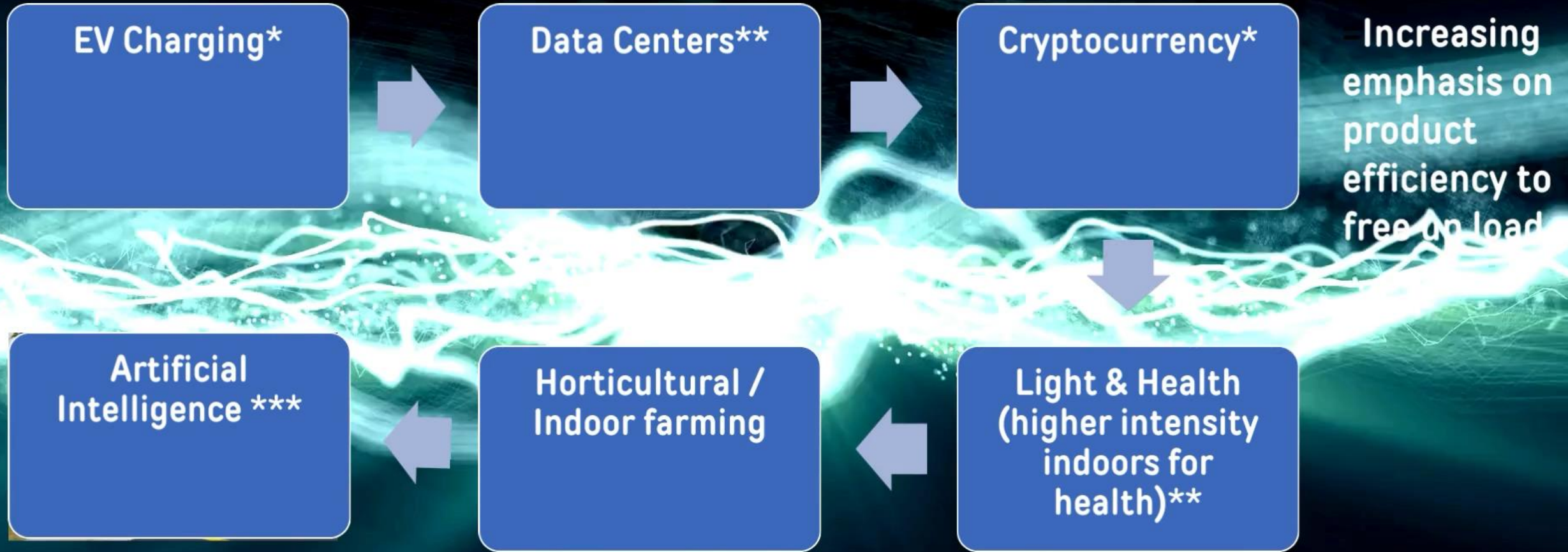


Beware & Prepare



Abundance & Increased  
Opportunity













# New Loads / Energy Efficiency Targets









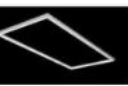












\*EV charging and cryptocurrency are new and extremely demanding loads on the power grid – If Bitcoin were a country, it would rank in the top 30 worldwide for energy use


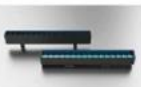










\*\* Data centers, light & health and horticultural lighting energy increases are due to market changes

\*\*\* AI large language models are extremely energy intensive as are AI applications.

SEQ #	VISUAL	ITEM NAME / <i>Significance</i> / Submittal Number / CONTACT INFORMATION
32		<b>BloomBox Luminaire</b> <i>2x2 with replaceable LEDs and 170 LPW</i> Submittal #54 Matt Kuehnel Genlyte Solutions – Ledalite 19750-92A Avenue Langley, BC V1M3B2 Canada matt.kuehnel@signify.com
33	 	<b>Strait Secure Slot Luminaire</b> <i>Behavioral health linear color changing with scenic imaging</i> Submittal #58 Amanda Schaneman Kirin Lighting 3401 E Jefferson Ave. Detroit, MI 48207 aschaneman@kirinlighting.com
34		<b>SimpleSeal CSSGI Troffer</b> <i>Shallowest plenum luminaire serviceable from below</i> Submittal #92 Joanne Cummins Kenall Manufacturing 10200 55th Street Kenosha, WI 53144 joanne.cummins@kenall.com
35		<b>Lino Linear</b> <i>Smallest outdoor linear; high efficacy ADA compliant</i> Submittal #17 Maddie Green A-Light 3728 Maritime Way Oceanside, CA 92056 marketing@alights.com
36		<b>BOA Field-Adjustable Linear</b> <i>Smallest form factor and high efficacy with adjustable CCT, wattage and direct/indirect ratio</i> Submittal #37 Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
37		<b>C-Wrap Linear Luminaire</b> <i>Highest efficacy field-adjustable wrap using bio-renewable materials</i> Submittal #76 Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
<b>WALLWASH</b>		
38		<b>GrazeFall Curve</b> <i>First 4-inch curved graze fixture</i> Submittal #91 Nancy Stathes Specialty Lighting Industries 1306 Doris Ave. Ocean, NJ 07712 nancy@specialty-lighting.com
39		<b>Mini RWX Luminaire</b> <i>Line extension to add wall-wash</i> Submittal #102 Darin Fowler Zaniboni Lighting 101 North Garden Avenue Clearwater, FL 33755 specdev@zanibonilighting.com
<b>TRACK</b>		
40	 	<b>830S LED Track Luminaire</b> <i>3D printed track head of recyclable polycarb</i> Submittal #63 Smita Anaokar Cooper Lighting Solutions 1121 Hwy 74S Peachtree City, GA 30097 smita.anaokar@cooperlighting.com
41		<b>Solaris LCV Trackhead</b> <i>First trackhead with multiple wireless options</i> Submittal #113 Sona Bill Solais Lighting 8655 Corporate Drive, Suite 100 Frisco, TX 75033 sona.bill@solais.com

SEQ #	VISUAL	ITEM NAME / <i>Significance</i> / Submittal Number /	CONTACT INFORMATION
42		<b>T40 Line Voltage Track Fixture</b> <i>Smallest form factor line voltage track head</i>  Submittal #123	Lyndsay Mayer Lumenture 482 Pepper Street Monroe, CT 06468 lyndsay.mayer@lumenture.com
<b>SUSPENDED</b>			
43		<b>HAZSHARK Luminaire</b> <i>Highest efficacy in category</i>  Submittal #41	Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
44		<b>Clear Coil Collection</b> <i>Uses molecularly-recycled material</i>  Submittal #50 	Gelane Pearson LightArt 4770 Ohio Ave. S, Ste. B Seattle, WA 98134 gelane.pearson@lightart.com
45		<b>LIBERA Luminaire</b> <i>Smallest of its type, high LPW, rotates 360°</i>  Submittal #55	Matteo Mengonii Guzzini 9320 Saint-Laurent Suite 100 Montreal, Quebec H2N 1N7 Canada matteo.mengonii@iguzzini.com
46		<b>Bolt Nova Luminaire</b> <i>Highest efficacy in asymmetric throw, 50C and IP66</i>  Submittal #68	Hanson Chen Meteor Illumination Technologies 1860 S Carlos Ave. Ontario, CA 91761 hanson@meteor-lighting.com
47		<b>WHIZ 2.0 Luminaire</b> <i>Small, high efficacy high bay with RGBW and DMX 512</i>  Submittal #70	Hanson Chen Meteor Illumination Technologies 1860 S Carlos Ave. Ontario, CA 91761 hanson@meteor-lighting.com
48		<b>Surround Frame Selectable</b> <i>Broadest family in its class</i>  Submittal #97	Jeff Hungarter Cooper Lighting 1121 Highway 74 S Peachtree City, GA 30269 jeffrey.hungarter@cooperlighting.com
<b>SURFACE MOUNT</b>			
49		<b>FRAME Luminaire</b> <i>High efficacy frame luminaire</i>  Submittal #60	Nick Adams Acuity Brands 1 Acuity Way Decatur, GA 30035 nicholas.adams@acuitybrands.com
<b>COVE</b>			
50		<b>GLS Flex Cove Light</b> <i>Field-curveable flexible cove with mud-in capability</i>  Submittal #90	Joe LoMenzo Light Engine Technologies, Inc. 200 Wilson St., A1 Port Jefferson Station, NY 11776 mail@lightengineled.com
51		<b>Invisible Air Return</b> <i>First invisible air return cove</i>  Submittal #124	Mark Zampini i2Systems 355 Bantam Lake Road Morris, CT 06763 mzampini@i2systems.com

SEQ #	VISUAL	ITEM NAME / <i>Significance</i> / Submittal Number / CONTACT INFORMATION
<b>UNDER CABINET</b>		
52		<b>HU30M Under Cabinet Luminaire</b> <i>First dim-to-warm undercabinet light</i> Submittal #61 Smita Anaokar Cooper Lighting Solutions 1121 Hwy 74S Peachtree City, GA 30097 smita.anaokar@cooperlighting.com
<b>HIGH BAY</b>		
53		<b>HAZL34 High Bay</b> <i>Hazardous location linear highbay C1D2</i> Submittal #21 Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
54		<b>HAZBAY LED Luminaire</b> <i>Hazardous location high efficacy high-bay and widest lumen range</i> Submittal #39 Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
<b>LOW BAY</b>		
55		<b>HAZLED Luminaire</b> <i>Hazardous location high efficacy low-bay and widest lumen range</i> Submittal #40 Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
<b>OUTDOOR - AREA</b>		
56		<b>Opti-Select Area Light</b> <i>Integral adjustable optics and output</i> Submittal #79 Robert Cilic LEDVANCE 181 Ballardvale Street, Suite 203 Wilmington, MA 01887 robert.cilic@ledvance.com
<b>BOLLARD</b>		
57		<b>Dual-Selectable Bollard</b> <i>Field selectable distribution via dip switch</i> Submittal #77 Robert Cilic LEDVANCE 181 Ballardvale Street, Suite 203 Wilmington, MA 01887 robert.cilic@ledvance.com
<b>WALL</b>		
58		<b>W22 Field-Adjustable Wallpack</b> <i>First wallpack with field-adjustable optics</i> Submittal #28 Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
59		<b>SLIM Wallpack</b> <i>Highest efficacy</i> Submittal #44 Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
60		<b>ClearCurve Luminaire</b> <i>Most distributions and optics</i> Submittal #93 Travis Johnson Cooper Lighting Solutions 1121 Highway 74 South Peachtree City, GA 30269 travis.johnson@cooperlighting.com

SEQ #	VISUAL	ITEM NAME / <i>Significance</i> / Submittal Number /	CONTACT INFORMATION
61		<b>Rozino Wall Grazing System</b> <i>Highest peak candela in class and unlimited runs</i> Submittal #104	Rick Schuett Optique Lighting 6121 Vallejo St. Emeryville, CA 94608 rschuett@optique-lighting.com
<b>ACCENT</b>			
62		<b>Medley Argo Pro Color-Changing Luminaire</b> <i>Reduced color striations compared to RGBW</i> Submittal #53	Bernice Burton Insight Lighting 4341 Fulcrum Way NE Rio Rancho, NM 87144 bburton@insightlighting.com
63		<b>KOLOLUX Luminaire</b> <i>Elliptical beam and field-rotatable optics</i> Submittal #69	Adam Warburton Lumascape 77 Brandl Street, Eight Mile Plains Brisbane, Queensland Australia adam.warburton@lumascape.com
64		<b>Low-Carbon Exterior Wall Wash</b> <i>Reduced carbon footprint</i> Submittal #72 	Jason Osterman SGM Light Inc. 7806 Kingspointe Pkwy Orlando, FL 32819 jos@sgmlight.com
65		<b>Tierra In-grade Family</b> <i>Highest lumens for its type</i> Submittal #78	Cecilia Ponzi Hydrel One Lithonia Way Conyers, GA 30012 cecilia.ponzi@acuitybrands.com
<b>ROADWAY</b>			
66		<b>AFL100 Series</b> <i>Wildlife sensitive</i>  Submittal #13	Newlin Tillunger WE-EF Lighting USA 410-D Keystone Drive Warrendale, PA 15086 n.tillunger@we-ef.com
67		<b>Archeon Roadway Luminaire</b> <i>Industry-leading roadway photometrics</i> Submittal #75	Bob Smith Cooper Lighting Solutions 1121 Highway 74 South Peachtree City, GA 30269 bob.smith@cooperlighting.com
<b>FLOODLIGHT</b>			
68		<b>HAZZFLED Floodlight</b> <i>Line extension</i> Submittal #23	Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
69		<b>X22 Selectable Floodlight</b> <i>Adjustable optics</i> Submittal #27	Shaun Fillion RAB Lighting 25-27 30th Drive Astoria, NY shaun.fillion@rablighting.com
<b>CONTROLS</b>			
70		<b>Dual-Tech Mesh Sensor</b> <i>First Bluetooth wireless mesh dual-tech sensor</i> Submittal #67	Scott Stenger mwConnect 1921 Arena Blvd. Sacramento, CA 95834 sstenger@mwconnect.us



SEQ #	VISUAL	ITEM NAME / <i>Significance</i> / Submittal Number / CONTACT INFORMATION
71		<b>X-PoE Lighting Controller</b> <i>Nodeless POE</i>  Submittal #34  Karl Jonsson LUUM.iO 1304 Logan Ave., Suite F Costa Mesa, CA 92626 karl@luum.io
72		<b>Extreme Range Outdoor Mesh Controller</b> <i>First Bluetooth, DALI version</i>  Submittal #121  Scott Stenger mwConnect 1921 Arena Blvd. Sacramento, CA 95834 sstenger@mwconnect.us
73		<b>Wireless DMX Track Feeds</b> <i>First wireless DMX track end feed</i>  Submittal #14  Brian Keilt Lighting Services Inc. 2 Holt Drive Stony Point, NY 10980 b.keilt@mailLSI.com
74		<b>WaveLinx Digital Control</b> <i>Wired and wireless nodes talk to each other without a server</i>  Submittal #86  Rahul Jog Cooper Lighting Solutions 1121 Highway 74 South Peachtree City, GA 30269 rahul.jog@cooperlighting.com
75		<b>Trellix Advancements</b> <i>Hybrid network flexibility</i>  Submittal #98  Michael Armstrong Cooper Lighting Solutions 1121 Highway 74 South Peachtree City, GA 30269 michael.armstrong@cooperlighting.com
76		<b>Bluetooth Sensor Controller</b> <i>First to incorporate open standards for mounting</i>  Submittal #46  Scott Stenger mwConnect 1921 Arena Blvd. Sacramento, CA 95834 sstenger@mwconnect.us
<b>LIFE SAFETY</b>		
77		<b>DirectDrive Emergency Tube</b> <i>UL924 classified emergency tube</i>  Submittal #45  Nick Baranowski KEYSTONE TECHNOLOGIES 2750 Morris Rd, Lansdale, PA 19446 nbaranowski@keystonetech.com
78		<b>ILD Emergency Driver</b> <i>Widest combination of features</i>  Submittal #15  Marc Dyble Acuity Brands 1361 E. Wieding Road Tucson, AZ 85706 marc.dyble@acuitybrands.com
79		<b>ELI-S-50 Driver</b> <i>Smallest 50W emergency inverter with up to 300W AC load capacity</i>  Submittal #89  Sean Cash Bodine 1125 Schilling Blvd E, Suite 108 Collierville, TN 38017-7078 sean.cash@signify.com
80		<b>Cold-Rated Battery Pack for LED Drivers</b> <i>Low temperature operation</i>  Submittal #112  Edwin Reyes Fulham Co Inc. 12705 S Van Ness Ave. Hawthorne, CA 90250 ereyes@fulham.com

SEQ # VISUAL ITEM NAME / Significance / Submittal Number / CONTACT INFORMATION

ACCESSORIES			
81		<b>Crosswalk Optics</b> <i>First crosswalk offering</i>  Submittal #64	Eric Ladouceur Cyclone Lighting 2175 Blvd. des Entreprises Terrebonne, QC J6Y 1W9 Canada eladouceur@cyclonelight.com
82		<b>Speck Light Exposure Sensor</b> <i>First wearable spectrometer</i>  Submittal #31	Erik Page Blue Iris Labs 18 Acacia Rd. Fairfax, CA 94930 erik@blueirislabs.com
LIGHTING SYSTEMS			
83		<b>BioUP with Wavelinx</b> <i>Auto-detects two 0-10V controls and functions wired or wirelessly</i>  Submittal #95	Tyler Mattler Cooper Lighting Solutions 1121 Highway 74 South Peachtree City, GA 30269 tyler.mattler@cooperlighting.com
84		<b>Omni QT System</b> <i>Narrowest aperture continuous channel</i>  Submittal #118	Darin Fowler Zaniboni Lighting 101 North Garden Avenue Clearwater, FL 33755 specdev@zanibonilighting.com
85		<b>BioUP Melanopic Lighting System</b> <i>Highest efficacy in melanopic system</i>  Submittal #120	Megan Tepo Cooper Lighting Solutions 18001 E Colfax Ave. Aurora, CO 80011 megan.tepo@cooperlighting.com
RESEARCH			
86		<b>Additively Manufactured Luminaire</b> <i>Research in 3D printing of luminaires</i>  Submittal #35	Samuel Mills Mills Eaton 26201 Northwestern Hwy Southfield, MI 48076 samtmills@eaton.com
PUBLICATION			
87		<b>TM-40-24 Technical Memorandum: IES Method for Determining Correlated Color Temperature (CCT) and Distance from the Planckian Locus of Light Sources</b> <i>New IES publication</i> Submittal #2	Dan Ozminkowski Illuminating Engineering Society 85 Broad St, 17th Floor New York, NY 10004 dozminkowski@ies.org
88		<b>ANSI/IES TM-32-24 Technical Memorandum: Lighting Parameters for Building Information Modeling</b> <i>New IES publication</i> Submittal #3	Dan Ozminkowski Illuminating Engineering Society 85 Broad St, 17th Floor New York, NY 10004 dozminkowski@ies.org
89		<b>RP-8-24 Recommended Practice: Lighting Roadway and Parking Facilities</b> <i>New IES publication</i> Submittal #4	Dan Ozminkowski Illuminating Engineering Society 85 Broad St, 17th Floor New York, NY 10004 dozminkowski@ies.org

Eaton is developing a fully integrated approach to manufacturing LED luminaires, leveraging additive-manufacturing technology. Carried out in partnership with the Lighting Research Center at Rensselaer Polytechnic Institute and the Xerox Research Centre of Canada, the project is investigating additive-manufacturing approaches that will significantly reduce cost, eliminate manufacturing waste, and improve luminaire efficacy.

## Melanopic DER

The melanopic daylight efficacy ratio measures how an artificial light source affects biology compared to daylight. A ratio of 1 indicates equivalence to daylight. Generally, artificial lighting falls below 1. Melanopic lighting has a 42% higher ratio than standard LEDs, without altering visual perception or light output. This graph shows the peak in the cyan wavelength, aligned with biological active light.



## 2024 PROGRESS REPORT ACCEPTED PRODUCTS

SEQ #	VISUAL	ITEM NAME / <i>Significance</i> / Submittal Number /	CONTACT INFORMATION
90		<b>ANSI/IES RP-46-23 Recommended Practice: Supporting the Physiological and Behavioral Effects of Lighting in Interior Daytime Environments</b> <i>New IES publication</i> Submittal #5	Dan Ozminkowski Illuminating Engineering Society 85 Broad St, 17th Floor New York, NY 10004 dozminkowski@ies.org
<b>DESIGN TOOL</b>			
91		<b>Product Finder Tool</b> <i>Line extension with more tools</i>  Submittal #114	Jacob Apple Parspec 1825 S Grant St., Floor 2, Suite 101 San Mateo, CA 94402 jacob@parspec.io

**PLEASE NOTE:**

A FULL VERSION OF THE PROGRESS REPORT WILL BE PUBLISHED IN THE NOVEMBER 2024 ISSUE OF LD+A.

 IES Video Series	 IES Webinar Archives	 Intro to Lighting
 IES Conferences	 Browse All Courses	 Partner Content
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THE MAGAZINE OF THE ILLUMINATING ENGINEERING SOCIETY

LD+A

Uspenska Square  
 Designing InFUNstructure  
 Shutter, Click, Snap: Part II  
 LIGHTING DESIGN AND APPLICATION

Wonders  
Never Cease

July 2024

enLIGHTEN yourself

EDUCATIONAL COURSES

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# Convergent Technologies Experiencing Exponential Growth

Computing  
(Quantum)

IoT / Smart & Connected  
(networking & sensors)

Artificial Intelligence /  
Machine Learning

3D Printing (sources,  
electronics, housings)

Robotics/Drones

XR  
(Augmented, Virtual, Mixed,  
Neutral & Parallel Realities)

Materials Science (graphene,  
quantum dots, etc)

Synthetic Biology  
(design/discovery of new  
materials through fusion,  
bioluminescence, biomimicry)

#1 NEW YORK TIMES  
BESTSELLING AUTHOR

MICHIO  
KAKU

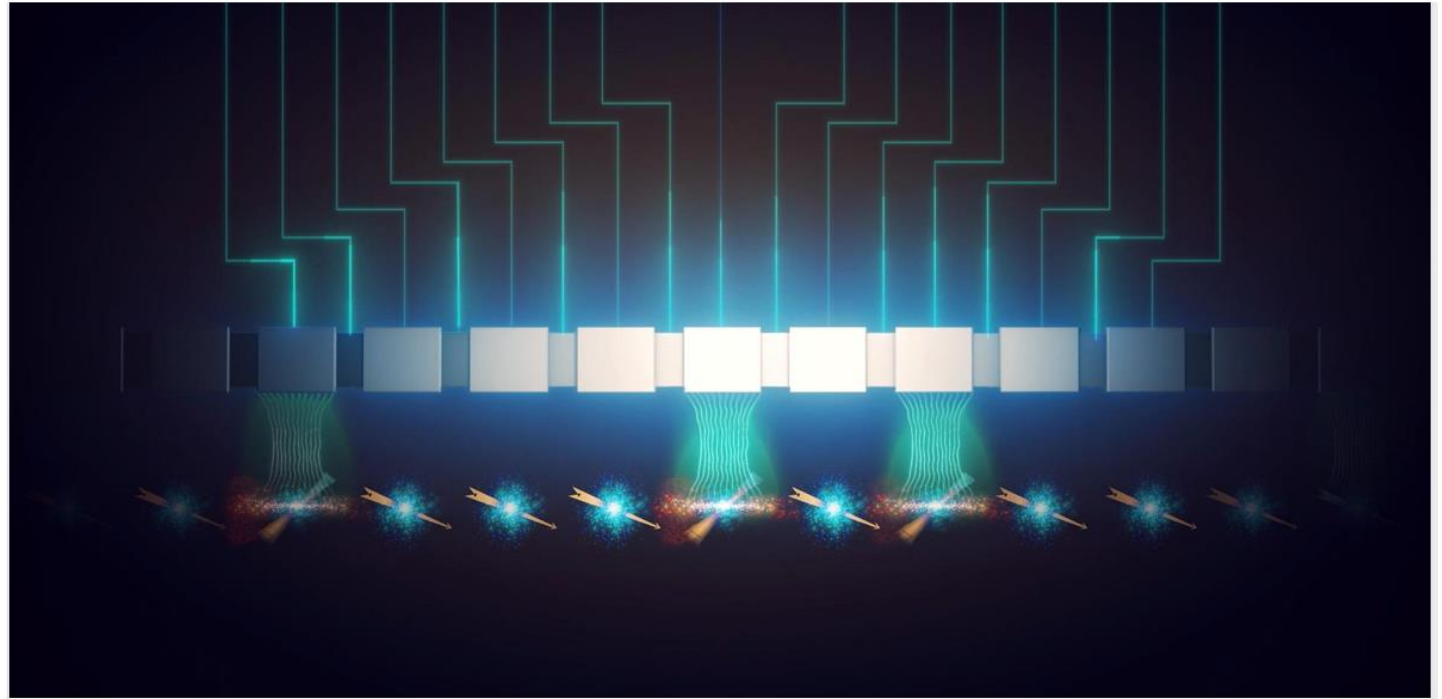
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QUANTUM  
SUPREMACY

HOW THE QUANTUM COMPUTER  
REVOLUTION WILL CHANGE EVERYTHING

**“What is at stake is nothing less than the future of the world economy.”**

- IBM =433 Qubits (goal is 1M Qubits)
- Juizhang (China) 76 Qubits
- Google 53 Qubits (quantum supremacy 2019)
- Intel 49 USA
- Canada Xanadu new Photon quantum comp. 8Q
  
- Google thinks 1M Qubits is possible in ten years & new competitor claims five (allows redundancy for a 1000 Qubit computer equals 1M Qubits assuring accuracy)
- Honeywell advocates for ion trap quantum computer system in near vacuum state with electric fields. Scaling is difficult as fields must be adjusted and that is difficult.
- Photons are faster than electrons and are replacing them in quantum computers and these operate at room temperature
- Lithium-ion batteries have 1% of the energy density of gas but other compounds have promise and can be simulated



## **Breakthrough Discovery Brings Billion-Qubit Quantum Computing Chips Closer**

[Discovery of previously](#) unknown effect makes compact, ultra-fast control of spin qubits possible. Australian engineers have discovered a new way of precisely controlling single electrons nestled in quantum dots that run logic gates. What's more, the new mechanism is less bulky and requires fewer parts, which could prove essential to making large-scale silicon quantum computers a reality.

“I believe even more about how profound spatial computing is. When you've tried it, it's an aha moment, and you only have a few of those in a lifetime.”

Tim Cook, CEO of Apple,  
Sep. 2023

## Spatial Computing

- An evolving 3D-centric form of computing
- At its core, uses AI, Computer Vision, XR & a wide range of technologies to blend virtual experiences into someone's experience of the physical world
- It enables humans to interact & communicate in new ways with each other & with machines/tech, as well as gives machines/tech the capabilities to navigate & understand our physical environment in new ways
- It will expand computing into everything you can see, touch, sense and know

**Spatial computing** is any of various human-computer interaction techniques that are perceived by users as taking place in the real world, in and around their natural bodies and physical environments, instead of constrained to and perceptually behind computer screens.



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The Free Encyclopedia

- **AI will increase our abilities.** Most of the jobs from a century ago are gone but more people, by percentage are working.
- **Physics and chemistry created biology and DNA, biology created brains. Our physical manipulation device, thumbs, created technology. Next, we will merge human technology with human intelligence.**
- **We will live increasingly online, and our brains will be connected online**
- **Exponential growth of computing power never stopped**
- **2029 AI passes the Turing test (arguably AI is conscious)**
- **2030's nanobots will connect our neocortex to the cloud merging human brains with AI**
- **2045 The Singularity/Computers change humans**

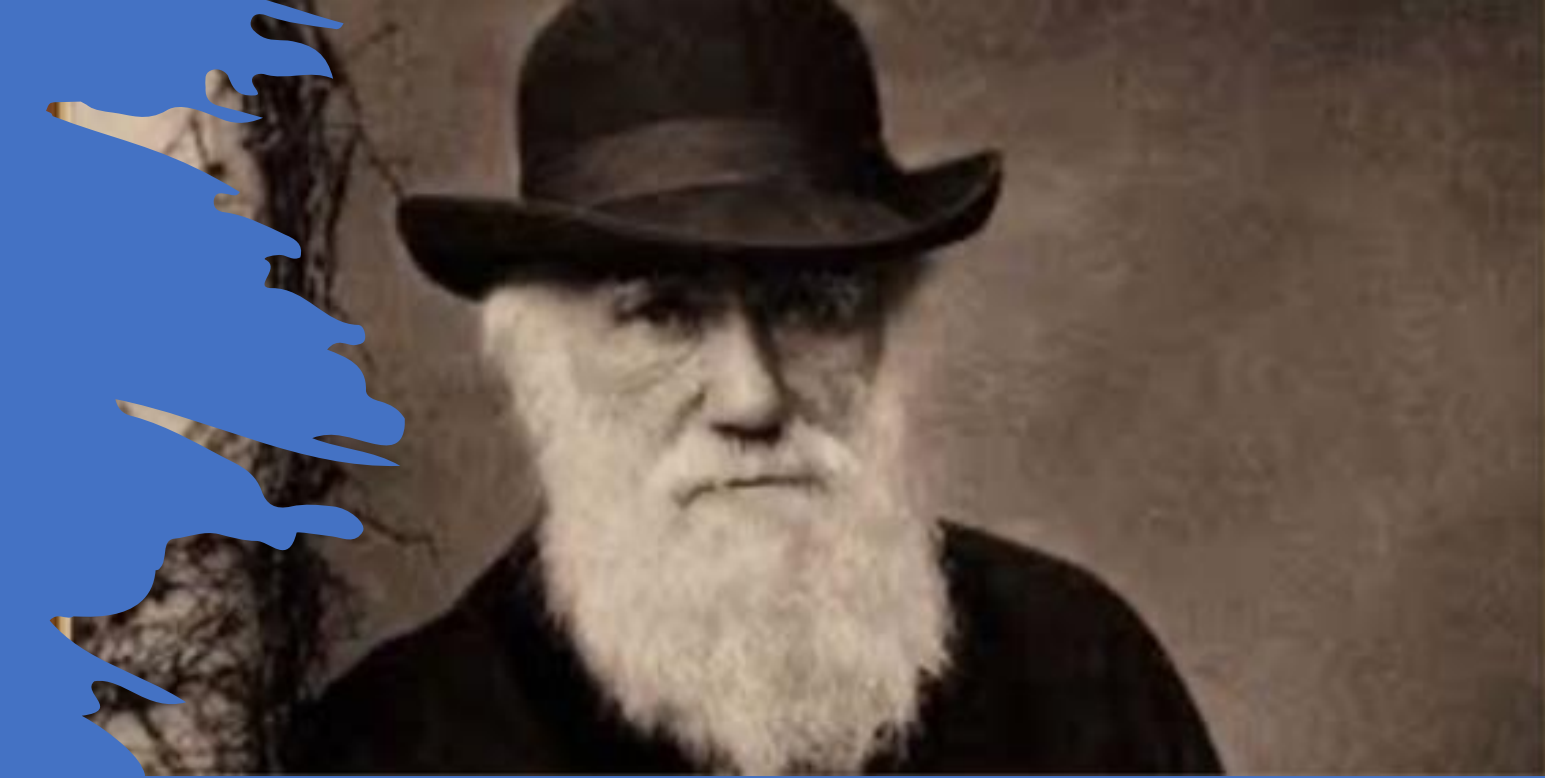


<b>Born</b>	Raymond Kurzweil February 12, 1948 (age 74) <a href="#">New York City, New York, U.S.</a>
<b>Alma mater</b>	<a href="#">Massachusetts Institute of Technology</a> (B.S.)
<b>Occupation</b>	Author · Entrepreneur · Futurist · Inventor
<b>Employer</b>	<a href="#">Google</a>



**“It is not the strongest of the species (or companies) that survives, nor the most intelligent, but the one most responsive to change”**

**– Charles Darwin**



# IES Nashville Section Virtual Meeting

Date: October 23, 2024,  
11:30 am – 1:00 pm

Topic: Lighting Progress 2024



Mark Lien  
LC, C-GUVMP, CLMC, CLEP, HBDP, LEED AP



IES Industry Relations Consultant / President, Augmented Illumination  
mlien@ies.org

