



Smart Landscape Lighting: A Review of Emerging Technologies

SPJ LIGHTING Inc.
ARCHITECTURAL LANDSCAPE & OUTDOOR LIGHTING

Purpose and Learning Objectives

Purpose: Modern landscape lighting systems featuring integrated automation and intuitive smartphone controls have revolutionized the industry. Designers can easily transform front lawns from eerie Halloween displays to soft, romantic ambiances with just the touch of a button. These new technologies provide seamless control and user-friendly interfaces while enhancing home occupants' safety and security. Additionally, the widespread adoption of LED lights within those systems has improved energy efficiency and expanded the range of available options. This course explores some of the key principles of landscape lighting design and the various related fixture types and highlights some of the latest advancements in smart landscape lighting technology.

Learning Objectives:

At the end of this program, participants will be able to:

- discuss the emergence of smart systems in landscape lighting, focusing on advancements in automation, ease of control, and customization options, and their multiple benefits
- recount some of the guiding principles of landscape lighting design and describe available associated lighting fixtures
- describe some of the available lighting fixtures that are compatible with smart control systems, and
- explore the benefits of LED technology and related systems, including energy efficiency, varied effects, rich color saturation, customizable light temperatures, and their effect on wildlife well-being.

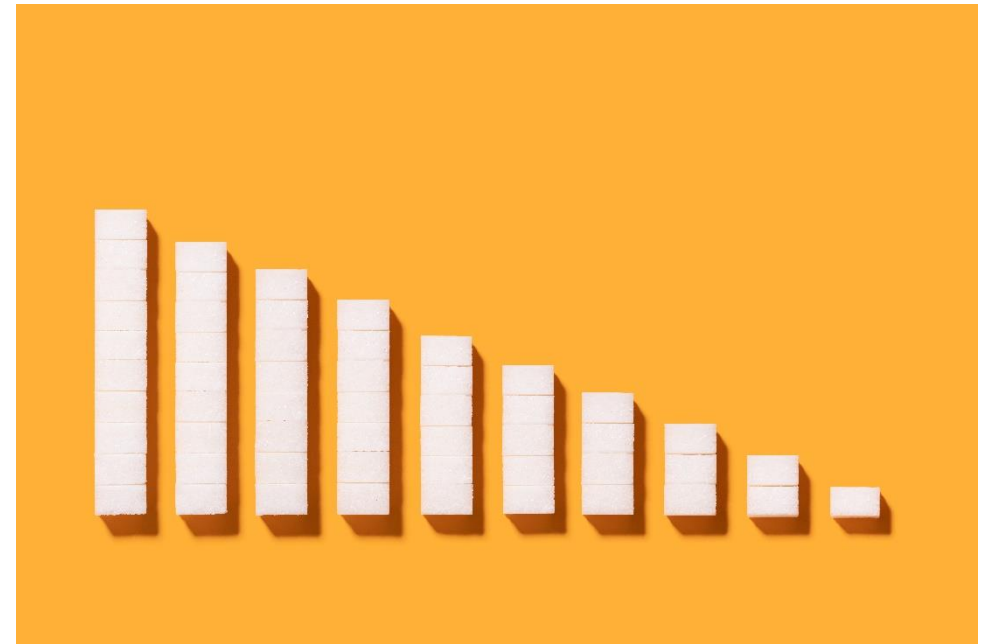


Introduction

Smart Homes and Automation

Home automation has advanced significantly, making smart, Wi-Fi enabled, and remotely operated devices essential for homeowners. Continuous technological improvements offer greater control, allowing homeowners to manage various setups easily with just a touch on their phone or tablet.

Statistics provided by *Statista* show a projected revenue in the smart home market of \$38.8 billion in 2024 in the United States. As a growing market segment, it indicates smart home automation is becoming an expectation. However, technology's reach and the need for automation extend beyond the boundaries of a home to the garden and landscaping, as well.



Smart Landscape Lighting Systems

The same trend is seen in landscape lighting systems.

In a Wi-Fi based lighting setup, smart controls provide complete flexibility for outdoor lighting. To create the perfect mood, users can customize scenes, zones, timing, colors, and dimming.

Traditionally, landscape lighting systems relied on transformers with timers and lighting sensors, requiring manual adjustments for daylight savings time. They were also vulnerable to power outages.

In smart landscape lighting systems, automation can happen via Wi-Fi transformers, which we will discuss later in more detail.





Benefits of Smart Landscape Lighting Control Technologies

Automation, Customization, and Energy Efficiency

LED lighting has revolutionized the landscape lighting sector.

With their energy efficiency, durability, and customizable colors, LEDs have inspired homeowners to experiment with various lighting effects and automated setups.

By integrating Wi-Fi and Bluetooth management and automation technology with color-changing LEDs, homeowners can transform outdoor spaces with a few taps, creating celebratory, dramatic, or romantic atmospheres on demand.

Dimming individual lights or light zones can further enhance the ambiance and reduce energy consumption. Additionally, automating systems to synchronize with natural daylight or residents' needs ensures lights are never left on unnecessarily, maximizing energy savings.



Reduced Environmental Impact

Artificial light at night (ALAN) significantly harms the environment. Unlike natural light, ALAN disrupts animal physiology and behavior, altering sleep, feeding, and reproduction patterns.

Bright lights attract birds, leading to building collisions, and disrupt the circadian rhythms of humans and animals. Blue-rich white light obscures stars and is particularly harmful to migrating birds, nesting birds, wildlife (including turtles), plants, and humans. It affects vulnerable populations such as owls, butterflies, and bees. Sea turtle hatchlings are especially affected, as they mistake city lights for the moon, leading them into dangerous urban areas instead of the ocean.



Reduced Environmental Impact

Overly bright lighting wastes energy and can create hazardous situations by producing high contrast between light pools and deep shadows, which can be dangerous for pedestrians and drivers.

In this context, the automation, customization, and dimming capabilities of automated LED lighting can benefit ecological systems. For example, the US Fish and Wildlife Service's Northeast regional office has reprogrammed its automatic lights to turn off from 8 p.m. to 5:30 a.m. daily to reduce bird collisions. Some of these changes would have been cumbersome or costly to carry out without the benefits of automated lighting systems.



Amber Lighting

In regions like Florida, where 90% of sea turtles in the US nest, the local Fish and Wildlife Conservation Commission has established guidelines to minimize the impact of ALAN. These guidelines include recommendations to install fixtures at low heights, utilize light sources with longer wavelengths (like amber or red LEDs), and employ shielded lighting fixtures to focus light where it's necessary while reducing unnecessary scattering and glare.

Turtle-friendly lighting often incorporates a cooler color temperature between 1800 and 3000K, a departure from the bluish-white hues. Certain manufacturers have developed various LED landscape lighting systems that meet turtle-friendly criteria while still offering pleasing aesthetics and meeting the requirements of property owners.



Increased Security

Using Wi-Fi-enabled and automated external lighting systems enhances security. Homeowners can remotely control access, conduct surveillance, and manage nighttime safety lighting. By designing lighting zones to eliminate dark areas and tripping hazards, these systems improve safety and give the impression that an empty home is occupied.



Satisfying the Ubiquity of Smartphones

The omnipresence of smartphones has made them an integral part of daily life for most of the population. This widespread adoption facilitates seamless connectivity, giving individuals the ability to remain plugged in, tap into a wealth of information, and utilize countless applications and services regardless of location or time.

As a result, homeowners increasingly demand systems that seamlessly integrate with their smartphones and modern way of living. Technologies failing to align with this expectation risk becoming obsolete in this era of interconnected living.



A nighttime photograph of a modern garden. A large, leafy tree is the central focus, illuminated from below with warm, golden light, making its leaves glow. The tree's trunk is thick and textured. In the foreground, there are concrete steps leading up to a lawn. To the left, a modern building with a flat roof is partially visible. The sky is a deep, clear blue. The overall mood is peaceful and sophisticated.

Review Question

List three of the benefits of smart landscape lighting control technologies.



Answer

Energy efficiency

Increased security

Reduced environmental impact



Light 101: Landscape Lighting Basics

Primary Colors

Additive color mixing happens when multiple colors of light are combined in the same area. It relies on the primary colors of light: red, green, and blue.

As these primary light colors are combined, each new color is lighter and less saturated than the original. Mixing light in red, green, and blue wavelengths results in white light when all three are combined.



Paint vs Light

Paint color mixing and light color mixing differ significantly.

In **subtractive color mixing**, combining the primary substance colors of red, blue, and yellow results in darker colors as each is added.

A substance like paint absorbs wavelengths of light from the visible spectrum, moving toward black as more colors are added and more wavelengths of light are absorbed.



Paint vs Light

This fundamental distinction is essential for understanding color behavior in various contexts, like art and digital displays.

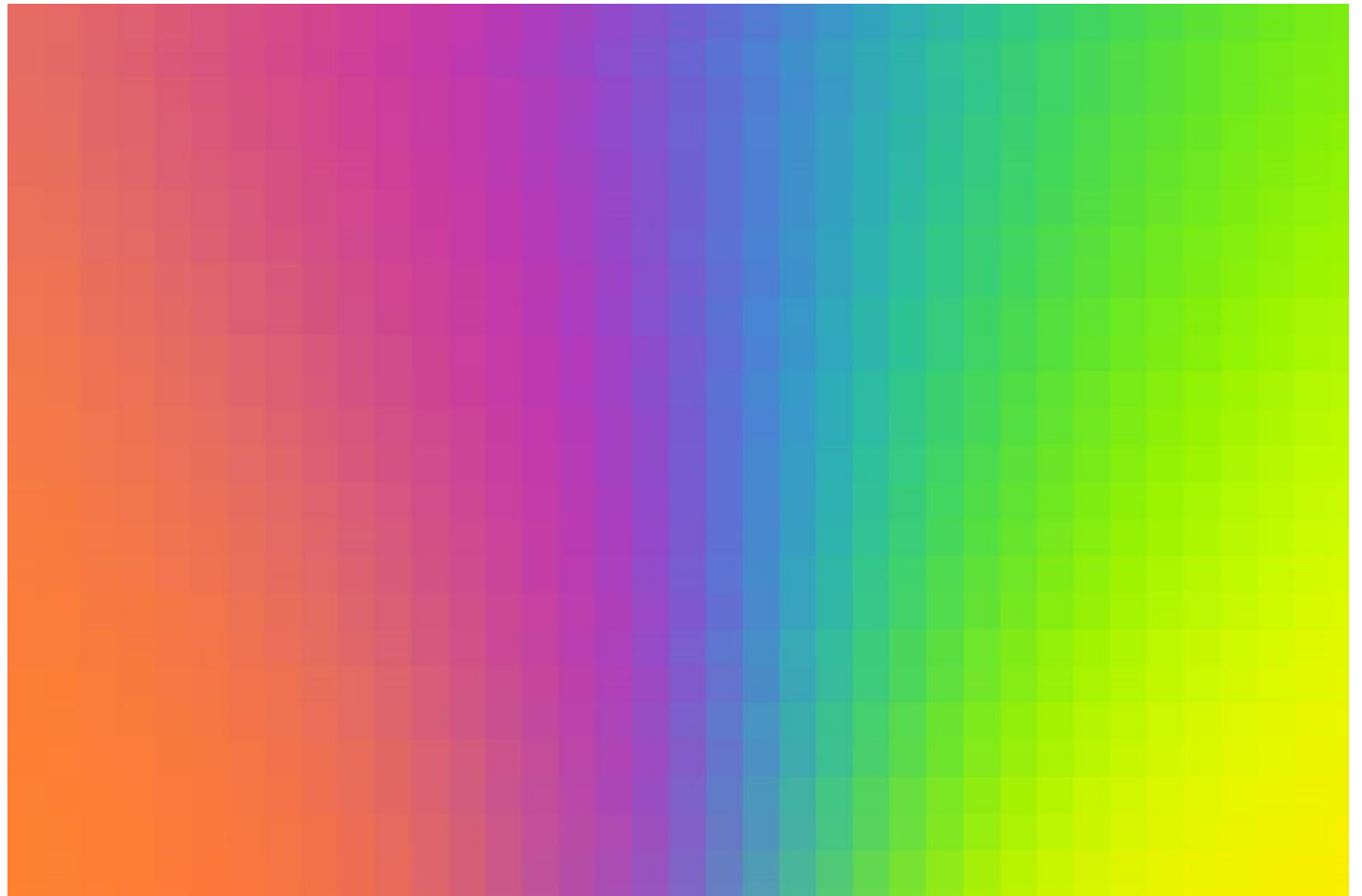
Red, green, and blue (RGB) form the foundation of RGB and RGBW LED lighting systems.



RGB Colors

The RGB (and hence the RGBW) color model is employed in digital screens like computer monitors, TVs, cameras, and LED lights.

Each primary color—red, green, and blue—can be depicted across 256 levels of intensity or shades. The scale spans from 0 to 255, where 0 signifies complete absence of intensity (fully off), while 255 signifies maximum intensity (fully on).



Color Rendering Index

The color rendering index (CRI) gauges how faithfully a light source reproduces the colors of objects compared to natural sunlight. CRI uses a scale from 0 to 100, with 100 indicating the highest level of accuracy in color representation.

A high CRI results in vibrant and true-to-life hues. Conversely, a low CRI in a light source can distort colors, leading to a dull or unnatural appearance.



RGB vs RGBW Lighting

RGBW LED light gets its name from the LED chips inside. While RGB has red, green, and blue chips, RGBW has an additional white chip. This enables the light to produce a larger spectrum of colors based on which chips turn on and the intensity of the light they emit, resulting in varying shades and saturations of the same color.

However, in RGB lighting systems, only colored lights are available, so they cannot produce true white light. Mixing those colors together creates a fictitious hazy white light, which viewers report as foggy and may cause visual discomfort. In comparison, RGBW produces a clean white light, providing a more comfortable visual experience.



RGB vs RGBW Lighting

By combining the output of the white LED with the primary colors, RGBW systems can produce a broader range of color temperatures, including warm white, cool white, and everything in between. This versatility allows RGBW systems to create a wider variety of lighting effects than RGB systems.

Conventional RGB LEDs are also limited in their ability to produce light at higher brightness levels. Consequently, achieving brighter lighting requires a larger quantity of LEDs. This approach increases not only manufacturing costs but also energy consumption.

In contrast, RGBW LED lights achieve equivalent brightness with fewer LEDs, resulting in lower energy consumption than RGB lights of the same brightness level.



RGB vs RGBW Lighting

The blending of colors on a larger scale in RGBW systems enhances lighting effects and results in a higher CRI, reaching up to 95 in an optimized condition.

Pulse width modulation (PWM) regulates the output of colors from RGBW LED lights. PWM operates by adjusting the voltage of each LED through its duty cycle, thereby regulating the current flowing through them. As the current increases, the LED shines brighter; conversely, the LED dims as it decreases.

Thus, RGBW lighting's advantages are:

- a cleaner, more natural white light
- a broader spectrum of colors with a greater variety of shades
- enhanced flexibility in color mixing, and
- uniform brightness with fewer LEDs and lower energy consumption, thus increasing overall lighting efficiency.



Setting the Mood via Landscaping Lighting

Landscape lighting must check off multiple boxes. It must illuminate and allow visual clarity, direct attention to the lit-up objects/scene, and set the mood for the space.

Through differences in light colors and tones, as well as light direction (uplights, downlights, projecting lights, etc.), different objectives can be achieved.

The type of light also makes a difference. For example, prominent pathway light fixtures emitting a bright light are more suited to commercial or public pathways of high use. Conversely, smaller pathway fixtures that emit a dimmer, softer hue of light are more suited to a private garden pathway, setting the theme for an ambient romantic stroll. Quality manufacturers also offer lighting fixtures that are compliant with DarkSky International guidelines.



Commercial pathway lighting



DarkSky International compliant pathway lighting



Setting the Mood via Landscaping Lighting

Accent lights and directional lights are often used to accentuate architectural features in a landscape or to direct attention to a sculptural element. People's eyes will follow where the light goes, and a unique texture or elements can be showcased merely by directing light at it. Light fixtures can also be used to define different zones, create symmetry or asymmetry, and draw attention to a focal point or part of a building facade.



Setting the Mood via Landscaping Lighting

Landscape lighting designers often employ a combination of directional lights from various angles to highlight larger landscape features, such as sculptures, water features, prominent trees, or uniquely shaped shrubs.

Using a monotone and subdued color palette can create a sense of subtlety and intimacy, while incorporating a variety of light colors can infuse the scene with energy and vibrancy.

Both approaches are viable, and with LED lighting, designers can use the same fixtures to achieve both effects through smart controls and programming.

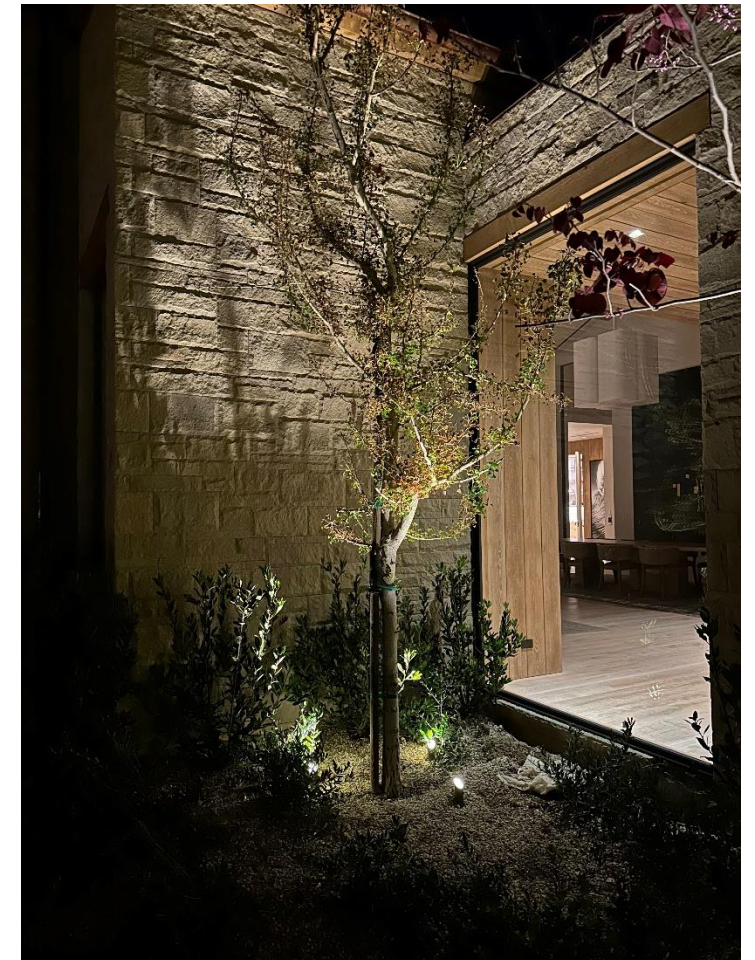


Setting the Mood via Landscaping Lighting

Designing outdoor lighting for nighttime requires careful attention, as the darkness can highlight any flaws in the setup. To achieve an effective design, a layered lighting approach is recommended. Depth can be achieved by combining different types of light, such as ambient lighting, focused lighting, and accent lighting. Designers can utilize different types of fixtures to create those layers, such as pathway lights, suspended lanterns, and wall-mounted fixtures.

To create an intimate mood, designers should choose warm, soft hues that are reminiscent of natural nighttime sources of light, such as the moon's glow, avoiding harsh brightness.

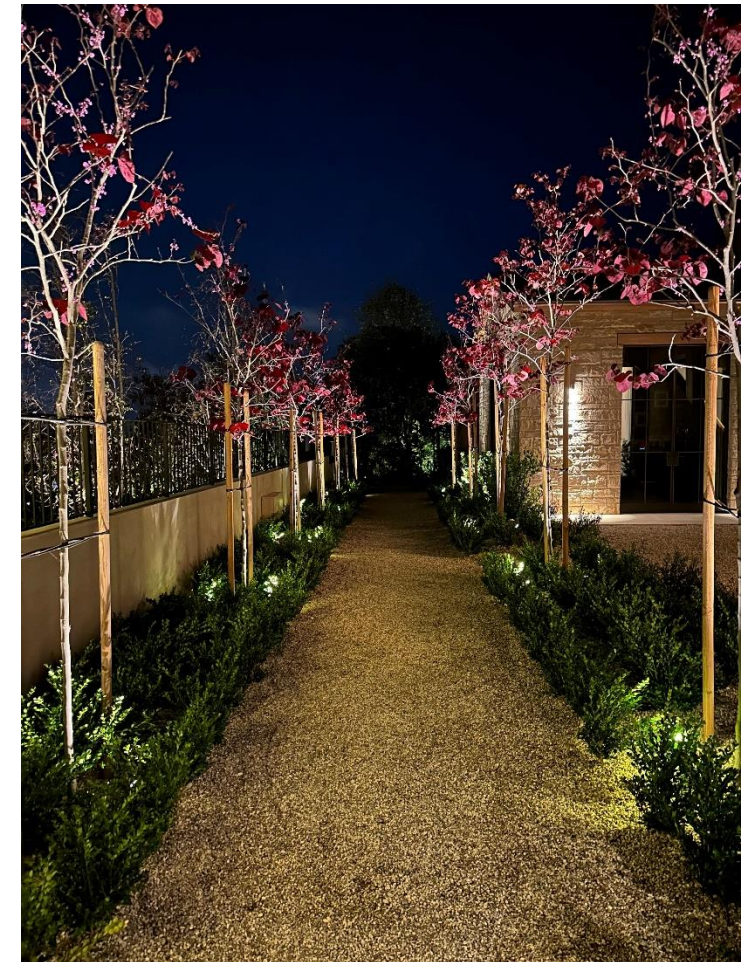
Different lighting angles create different effects; uplighting creates a dramatic effect while downlighting is recommended for practical purposes. Incorporating dimmers and timers allows for intensity adjustments and scheduled illumination, helping to conserve energy while maintaining a serene ambiance.



Setting the Mood via Landscaping Lighting

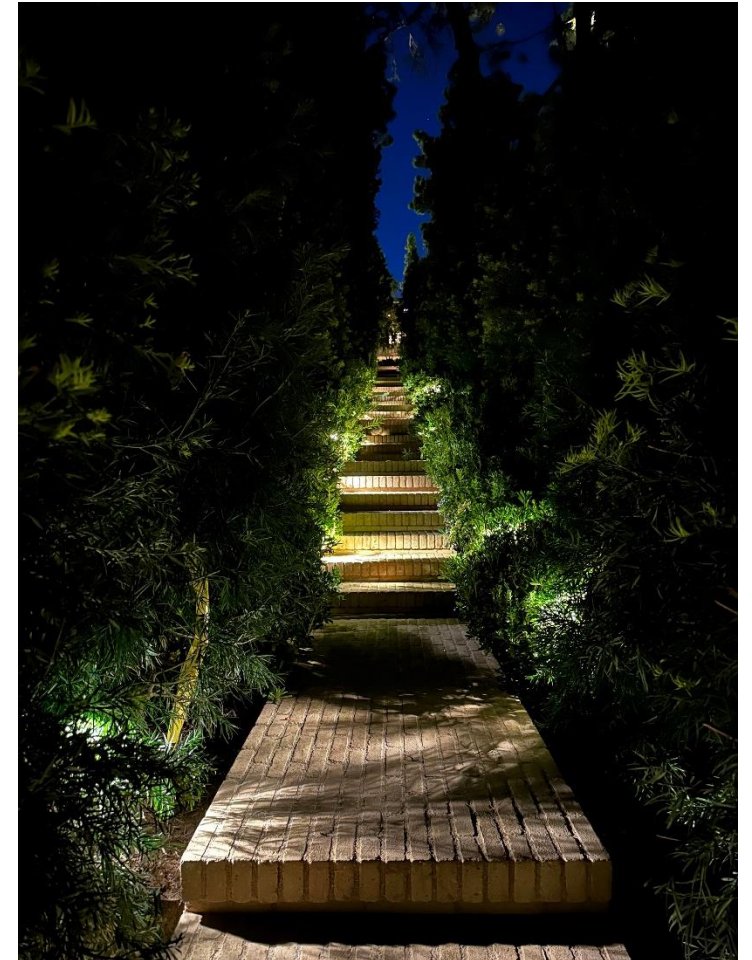
To summarize, a successful landscape lighting design should achieve the following:

- Provide visual depth
Through the layering of light and utilizing different types of light fixtures, the design should create depth and draw the attention of the user deeper into the landscape.
- Enhance the user's experience
The right lighting design can either make or break a user's experience. Programmed effects can be easily altered to suit different occasions.
- Provide safety
While creating dramatic or romantic effects is important, so is occupant safety. Lighting should be sufficient for users to traverse a path or navigate from one point to another safely.



Setting the Mood via Landscaping Lighting

- Create perspective
The desired visual effects should be conveyed from different perspectives; as people travel within a landscape, lights should not hit them directly in the eye when viewed from different perspectives.
- Highlight focal points
Draw a visitor's eye to different parts of the garden, highlighting any important focal points or sculptural elements.
- Create symmetry and balance
Lights can be used as a design element, creating symmetry and balance in a view.
- Unify the design
Using the right types of lights and color schemes can bring the landscape together, uniting different zones or separating them as needed.



Landscape Lights: Types of Fixtures

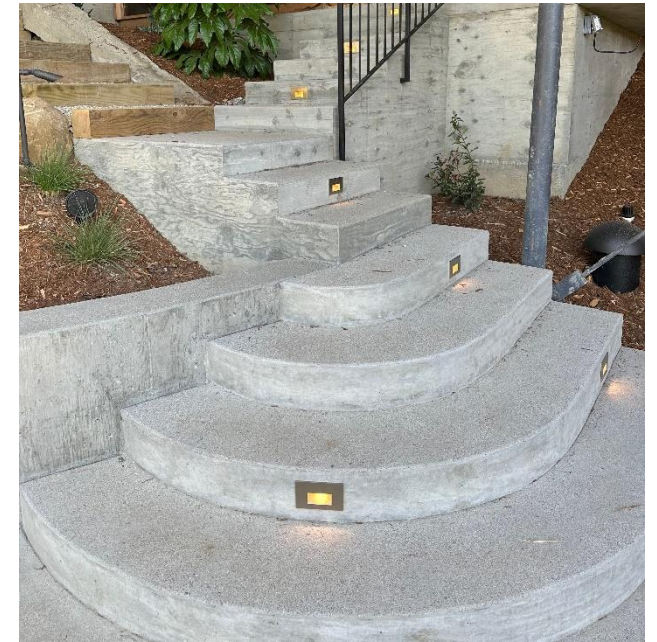
To achieve design objectives and set the right mood, designers have an array of RGBW LED landscape light fixtures to choose from, with an array of finishes, lighting abilities, and settings. It's important to ensure lights are compatible with the smart technology selected by the designer.



Path or Area Lights



Directional and Wall Washers



Recessed Lights: Step Lights, Well Lights, and Underwater Lights

Landscape Lights: Types of Fixtures



Strip Lighting



Patio or Deck Lighting



Pendant, Hanging, or Catenary Lighting



Review Question

What differentiates RGB from RGBW lighting?

A nighttime photograph of a garden. In the foreground, there is a stone wall with several steps. Behind the wall is a lawn and a large, dense tree. The tree is illuminated from below, casting a warm, golden glow on its leaves and trunk. The sky is dark blue. The overall scene is a well-lit outdoor space at night.

Answer

RGBW LED light gets its name from the LED chips inside. While RGB has red, green, and blue chips, RGBW has an additional white chip. This enables the light to produce a larger spectrum of colors based on which chips turn on and the intensity of the light they emit, resulting in varying shades and saturations of the same color.

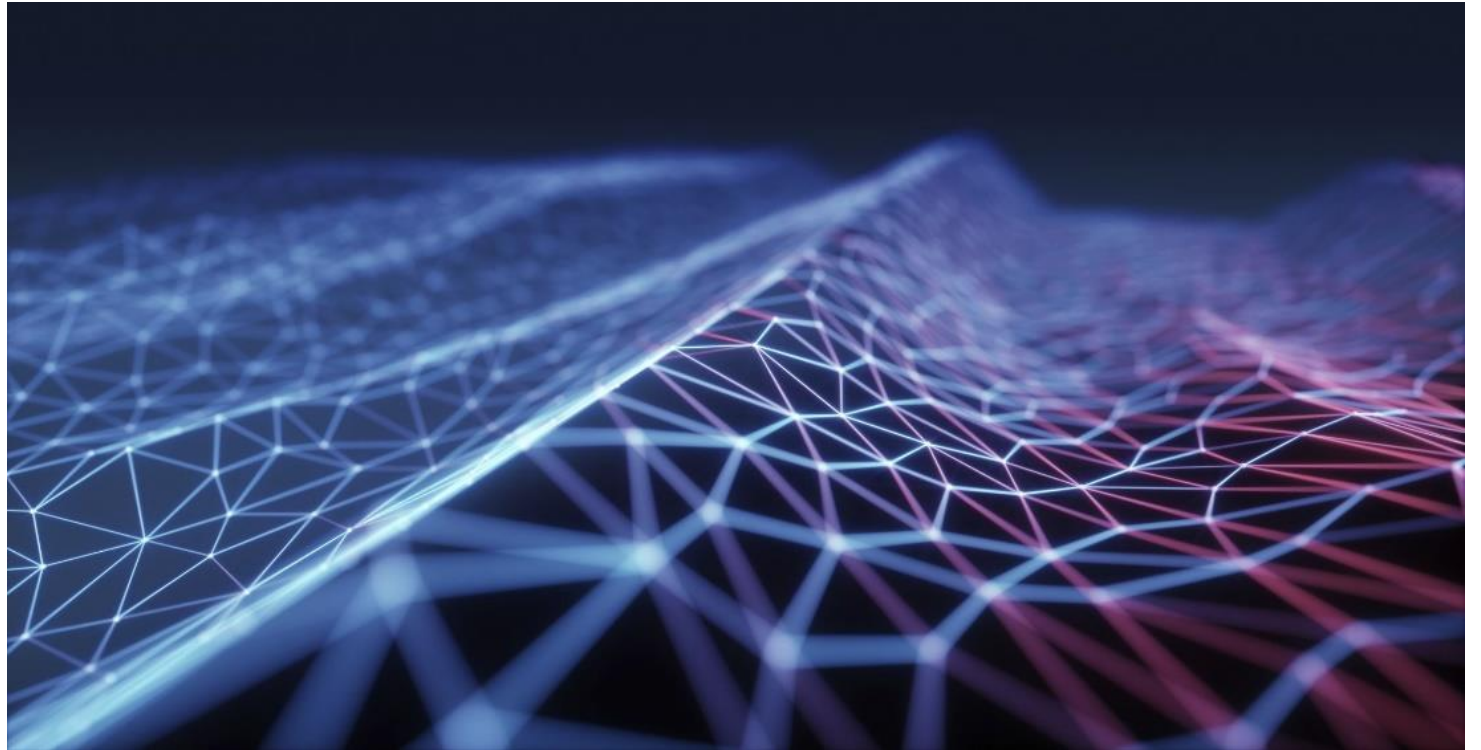


Bluetooth Landscape Lighting Systems

Landscape Lighting: Bluetooth Technologies

Manufacturers have developed various protocols and linking systems to facilitate the programming and control of RGBW LED lighting systems, offering users convenient setup and remote operation.

Compared to traditional setups like DMX systems, these newer technologies are simpler, easier to install, and more user-friendly. Next, we will highlight systems based on Bluetooth connectivity.



Bluetooth Landscape Lighting Systems

Using radio frequency, data is wirelessly transmitted over short distances in Bluetooth enabled light fixtures, offering individual control or connection in a mesh network. This network acts as a relay system, allowing messages to pass seamlessly from one fixture to another. Typically, in this type of system, transformers are not as important, as each fixture is its own receiver or “brain,” so app control systems communicate directly with the fixture itself, not the transformer.

Bluetooth landscape lighting systems are controllable via a smartphone app and require the smartphone to be within physical proximity of one of the fixtures within the mesh network. These systems are available in both consumer and commercial grades.

Pros include intuitive plug-and-play, a smartphone app interface, and a wide selection of exterior light fixtures. The app can create scenes and control groups or individual light fixtures, including white light color tuning and precise RGBW control.



Bluetooth Landscape Lighting Systems

Furthermore, a designer can set up scenes on a smartphone, then send a copy of the lighting program to the building owner via email or Wi-Fi. The designer can create multiple jobs on their account. Some manufacturers offer replaceable LED light engines. Commercial-grade quality and durability are available. This is a mature technology and is generally less expensive than Wi-Fi systems.

Cons include a limited distance range, where obstructions can interfere with the communication chain. Not all systems have scheduling or astronomical timing capabilities, so a Bluetooth timer must be added to the lighting transformer. Password protection is a must to prevent accidental access by any neighbors who have the same system. In some systems, there is no remote control; thus, the smartphone controller must be within Bluetooth range of the light fixtures.



A Flexible-Link Bluetooth RGBW Landscape Lighting System

One type of system is a flexible-link Bluetooth system, which provides precise reliability and control through a smartphone app that users can freely download. Unlike traditional systems that require individual IDs or channels assigned to lights, users only need to power up the Bluetooth-connected device and allow it to identify and configure system lights.

This system lets users easily name lights, adjust dimming, and set up schedules like dimming lights by 50% at 1 a.m., switching to soft blue light at 9 p.m., or creating a party scene for weekends. It's designed for simplicity, automatically adding nearby lights when first set up manually. Once lights are in the system, controlling them through the app is easy.

Users can also organize different areas, customize RGBW colors, create their own scenes, and use features like astronomical timing to schedule lights to turn on or off based on sunrise and sunset, with options to set additional times.



A nighttime photograph of a garden. The scene is dominated by large, dark trees with dense foliage. Warm, golden light from hidden sources illuminates the leaves, creating a soft glow. In the foreground, a low, light-colored stone wall runs across the frame. To the left, a paved area is visible. The sky is a deep, clear blue. The overall mood is serene and romantic.

Review Question

When trying to create a romantic mood in a garden, what are the recommendations for lighting designers?

A nighttime photograph of a garden. The scene is dominated by large, dark trees with dense foliage. Warm, yellowish light is cast from within the trees, creating a soft, intimate glow. In the foreground, a stone wall or low wall runs across the frame, and a paved area is visible. The sky is a deep, clear blue. The overall mood is serene and elegant.

Answer

To create an intimate mood, designers should choose warm, soft hues that are reminiscent of natural nighttime sources of light, such as the moon's glow, avoiding harsh brightness.



Wi-Fi Landscape Lighting Systems

Wi-Fi Landscape Lighting System Components

This is an emerging technology for commercial-grade lighting control. The Wi-Fi enabled lighting transformer is connected to a Wi-Fi network, and compatible light fixtures receive data through the same cables as low-voltage power. This system also allows remote control of the lighting via a smartphone app and a cloud-based account. These are the basic components for a typical Wi-Fi lighting system:

- Wi-Fi enabled transformer
- Smartphone app
- Compatible Wi-Fi enabled light fixtures

Transformers are essential for converting the standard 120V input (in North America) to the lower voltage needed for most landscape lights. They also enhance efficiency by offering a central connection point for accessing multiple zones simultaneously.



Wi-Fi Enabled Transformers

With Wi-Fi enabled transformers, the transformer connects to the cloud via Wi-Fi, allowing homeowners and property managers to control landscape lighting systems remotely.

This connectivity enables manufacturers to provide better support, including uploading bug fixes, upgrading features, and resolving issues remotely. It also allows lighting designers and installers to program and troubleshoot landscape lights from afar, reducing the need for costly and time-consuming site visits.

Some Wi-Fi enabled transformer models are also designed to operate independently when disconnected from the cloud, with their schedules stored locally on the device.



Wi-Fi Enabled Transformers

When installing, ensure the transformer is positioned near a robust Wi-Fi signal. Consider transformer specifications, such as total capacity and the number of zones, which vary among manufacturers. For instance, a transformer with a 300W capacity may offer three zones accommodating up to 30 light fixtures each. Multiple transformer zones provide flexibility, allowing users to override programmed schedules as needed, such as manually dimming a patio area.

For example, the model shown on the right boasts the following:

- A 300 W total load combined over three channels with independent zone Wi-Fi controlled via smartphone
- Made of 304 stainless steel with a locking hinged door to prevent vandalism
- Equipped with astronomical timer scheduling via a smart lighting app
- Has an integrated circuit breaker protection



Smart Wi-Fi Enabled Landscape Lighting Systems

Pros are that the hardwired connection between light fixtures and the Wi-Fi transformer means unparalleled signal reliability no matter how distant the fixture. As mentioned previously, the cloud-based app allows sophisticated programming and control from anywhere in the world—by zone, scene, individual fixture, white light color tuning, and precise RGBW control. It also allows remote firmware updates, new feature installation, and troubleshooting by the manufacturer. The customizability also allows for astronomical timing and even special seasonal scheduling for turtles or nesting birds.

Convenient remote access lets the designer update or add scenes on behalf of the owner without the expense of site visits. Some manufacturers offer replaceable LED light engines. Programming resides in the transformer—if Wi-Fi goes down, as long as the transformer has power, the programming and scheduling will continue.

Cons include the fact that as this is an emerging technology, the ease of use and quality varies widely among manufacturers. The breadth of compatible light fixture offerings also varies among systems and manufacturers. The transformer requires a strong Wi-Fi signal.

A Flexible-Link Wi-Fi RGBW Landscape Lighting System

This innovative system harnesses the power of Wi-Fi connectivity and cloud technology, allowing seamless programming and control from any corner of the globe. It relies on a Wi-Fi enabled transformer, which is connected via power line control (PLC), utilizing low-voltage two-wire connections for efficient operation.



Installation

To set up the system, a user begins by downloading the app on their phone. Next, the transformer should be mounted close to a strong Wi-Fi signal and connected to the desired Wi-Fi network. Then, one by one, each fixture must be plugged into the ID port on the transformer, and the app must be used to configure each fixture's ID. The fixtures shown here are specially designed to connect to such a system. Manufactured of marine-grade solid brass, they offer RGBW PLC capabilities. Light fixtures can be installed as desired. Finally, the app can be utilized from anywhere to conveniently program zones and scenes to the user's preferences.

Every Wi-Fi landscape lighting app empowers users to create customized scenes and manage individual fixtures. In the following slides, we'll explore some common app functions, noting that the interface design may vary across different platforms.



Smartphone App

A cloud-based smartphone app enables users to log in from anywhere using multiple devices. Each connected compatible lighting fixture is assigned its own ID and can be programmed with scheduled options for specific times and days of the week, as well as astronomical timing, color schemes, and effects.

Users can create customized scenes by saving settings for groups of fixtures, allowing for easy scheduling. Additionally, preset effects are available for effortless color changes. The process of programming zones and scenes involves utilizing the app's intuitive interface, which guides users through the setup process step by step.



App Functionality

Programming Fixtures

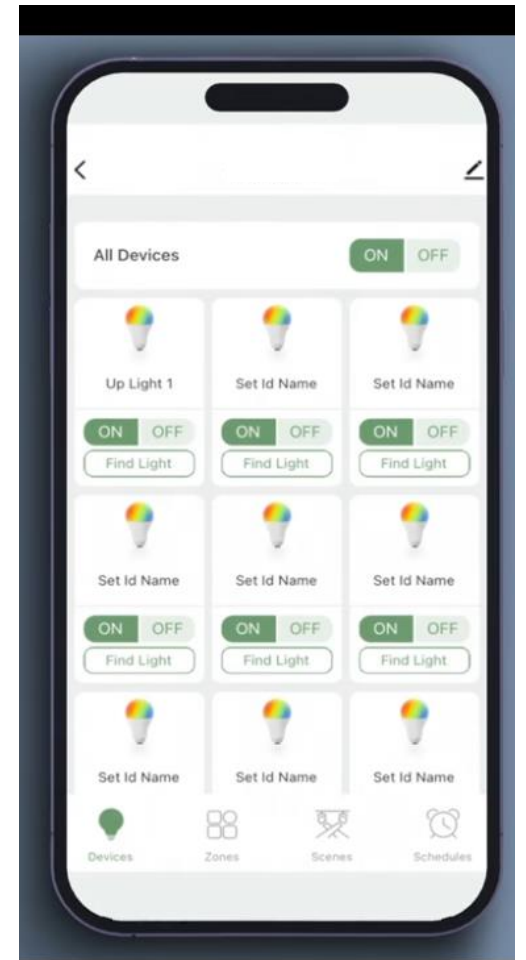
Custom fixtures intended for use with these systems ease the process via their interactivity; some will blink white several times to display connectivity.

Schedules and Timing

It can be based on astronomical timings and accommodates different schedules for different fixtures, allowing individual day-by-day setups.

Individuality

App functionality allows the individual control of fixtures or controlling them as a collective.



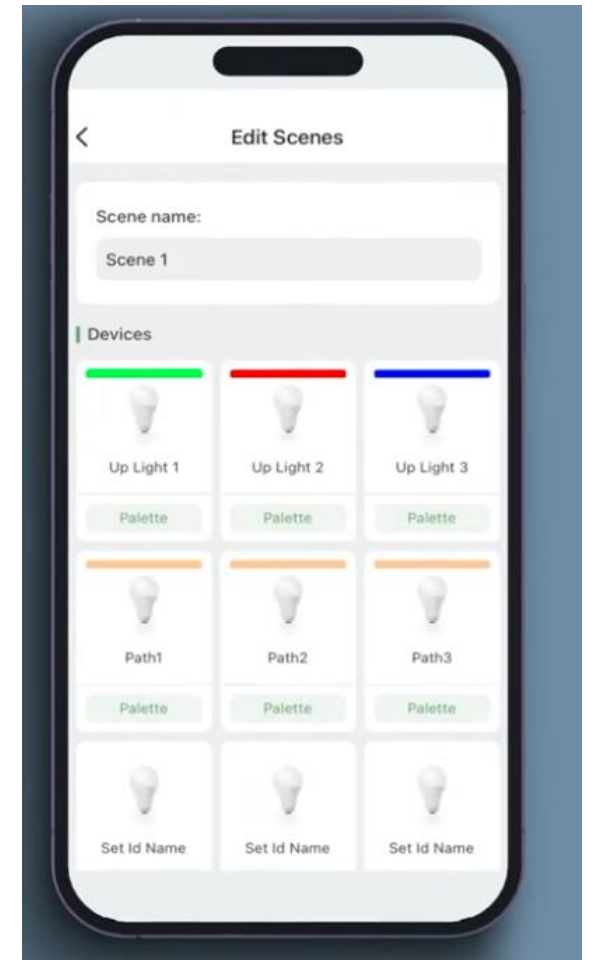
App Functionality

Scene Creation

Creating a scene begins by selecting the transformer and the lighting fixtures involved. A user then would proceed to select the palette—the light color each fixture would emit. The app allows scheduling for the scene, as well as a preset menu for desired effect and mood.

Tap-to-Run

This option allows users to run a scene, automating all involved schedules and setup through a single tap.



Wi-Fi Enabled Light Fixtures

For compatibility with the transformer, it's essential to choose Wi-Fi enabled fixtures, which can vary depending on the manufacturer. Some manufacturers offer a specific set of compatible fixtures, while others allow users to specify any LED fixture from their product line with Wi-Fi compatibility.

When selecting fixtures, consider durability, with materials like solid marine-grade brass and copper offering the best longevity. It's advisable to avoid lacquer finishes, as they tend to degrade over time; instead, opt for fixtures with a durable physical vapor deposition (PVD) finish for superior durability. Note that whereas a chrome finish is considered environmentally unfriendly, you can achieve the look of stainless steel and chrome with PVD finishes.



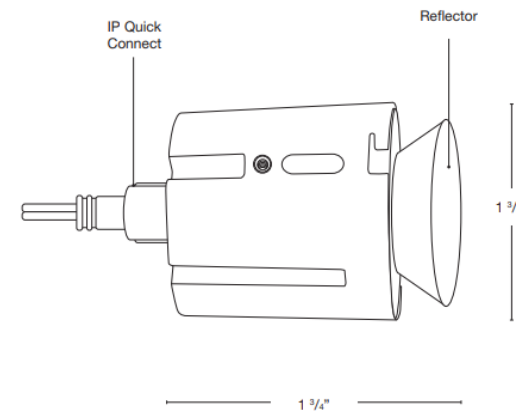
Wi-Fi Enabled Light Fixtures

When reviewing your options, it's important to note the distinction between LED bulbs and integrated LED lights.

Integrated LED modules are typically composed of an LED light source (LED chips), driver electronics, and a heat management system (or heat sink), with LED chips sometimes directly mounted onto the circuit board. The components act together as one integrated unit/light in the form of a light module.

Integrated LED Module Key Characteristics:

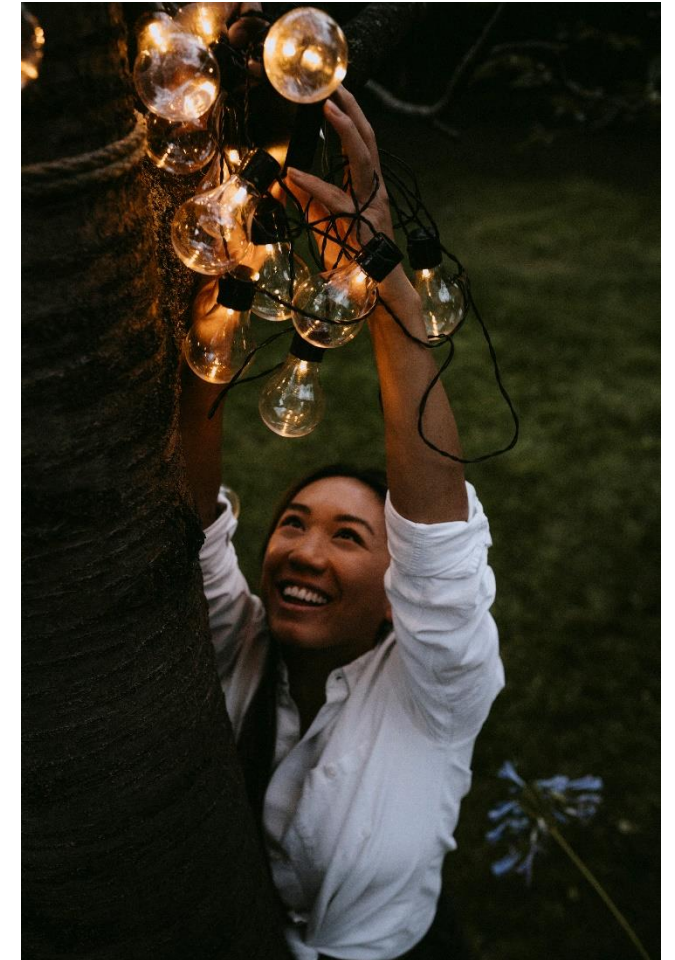
- Integrated LED lights are better at conducting heat away from LED (chips), extending their life span.
- Integrated LED lights tend to have better energy efficiency.
- Integrated modules come in a wide variety of shapes and sizes, allowing for more creative applications.



Wi-Fi Enabled Light Fixtures

- In the case of integrated modules, if the LED fails, the whole module may need to be replaced. Lesser-quality fixtures have nonreplaceable integrated LEDs; look for products with replaceable LEDs and drivers. Some manufacturers offer interchangeable LED light engines, an all-in-one replacement unit.
- Integrated modules usually perform better in terms of consistency, color rendering, and brightness.

LED bulbs are meant to take the place of traditional fluorescent or incandescent light bulbs in existing fixtures. The LED chips, driver, and heat management system are contained in the bulb structure, much like traditional bulbs, which can simply be screwed onto the light fixture.



Wi-Fi Enabled Light Fixtures

LED Bulb Key Characteristics:

- Their format means they are easily replaceable and interchangeable. That makes them ideal for retrofits.
- They are standardized and identifiable by bulb size and base type, making them easier for the consumer to understand and select.
- A main caveat with this type of bulb is the likely corrosion of the socket over time, causing them to fail prematurely.

In conclusion, both options are useful in specific scenarios, and the choice ultimately lies with the lighting designer or homeowner based on the situation and design objectives.



Wi-Fi Enabled Light Fixtures

The models featured here are of contemporary path lights. The model on the right is a solid brass lighting fixture with a matte bronze finish, designed to operate on a 12V electrical system. It has a wattage of 2W, powered by an LED engine, and produces 150 lumens of light. The fixture also comes with a ½" NPT mounting and includes a dual-fin spike for easy installation.

Alternatively, the model on the left is a versatile lighting fixture available in solid brass or copper, with a customizable finish. It operates on either a 12V or 120V electrical system and is also equipped with an LED engine that provides 150 lumens of warm light at a color temperature of 2700K. This fixture also includes a ½" NPT mounting with a dual-fin spike.

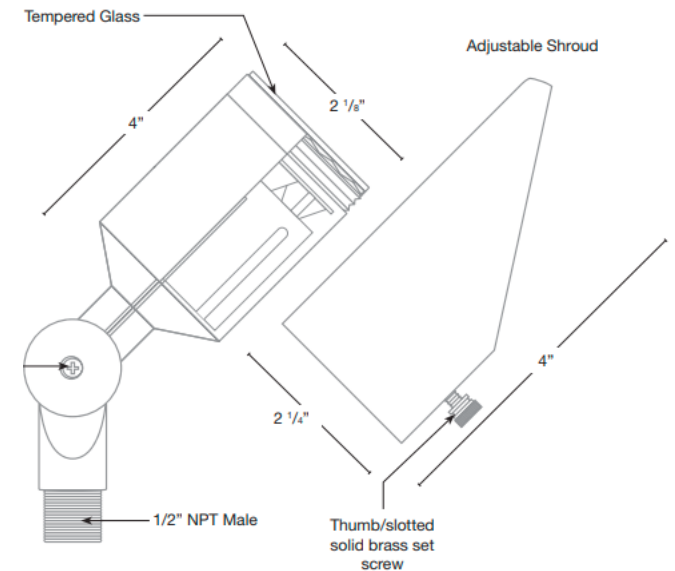


Wi-Fi Enabled Light Fixtures

This wall-mounted light fixture is made of solid brass with a matte bronze finish. It features a unique glass design that is half clear and half frosted. The fixture operates on either 12V or 120V electrical systems and comes with a 10W integrated LED engine.



This model is a lighting fixture made from solid brass with a black finish. It operates on an electrical range of 12V to 15V with a power consumption of 8W, using an LED engine. The fixture provides 390 lumens of light output and features a 1/2" NPT mounting with a dual-fin spike included.

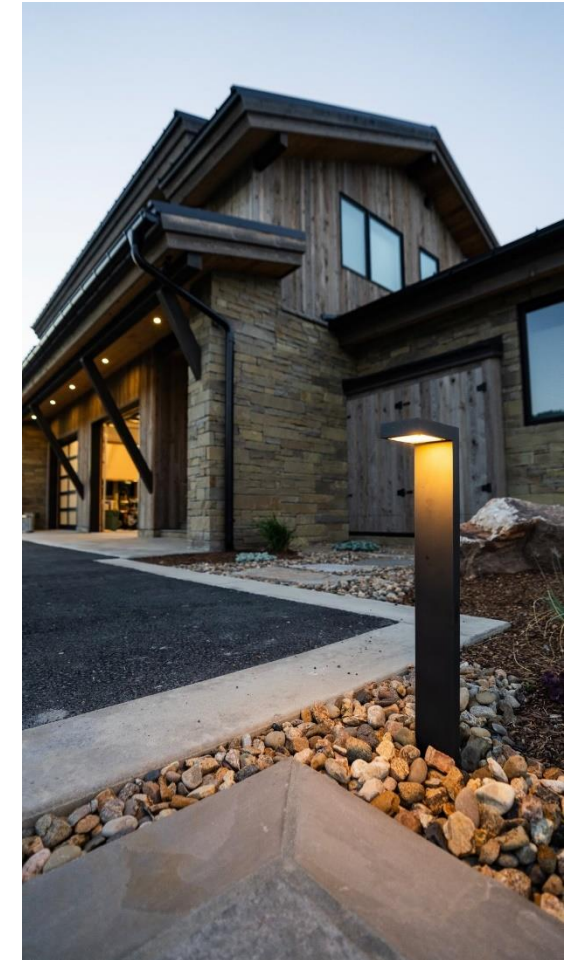


Wi-Fi Enabled Light Fixtures

DarkSky Approved Lighting

DarkSky International works to educate on and advocate for protecting the nighttime environment from light pollution. The DarkSky Approved program offers third-party certification to lighting products, designs, and projects that contribute to reduced light pollution and light trespass as well as minimized glare.

DarkSky Approved outdoor landscape lighting is specifically designed to reduce light pollution and skyglow by directing light downward. These fixtures are engineered to concentrate illumination on specific areas, preventing excess light from scattering into the night sky. By following DarkSky International guidelines, these lights help maintain the natural beauty of the night and enhance visibility.



Warranty

Local manufacturing (in the US) ensures safety standards and other regulations are addressed and complied with.

A warranted product by a quality manufacturer may cost more initially but would prove more economical in the long run, especially in cases where an entire system is purchased. Follow-up and maintenance will help the system perform optimally, saving the homeowner unnecessary costs and worry. When specifying a product, looking for a good warranty is important. For example, one manufacturer offers a lifetime warranty for its solid brass and copper light fixtures.





Summary and Resources

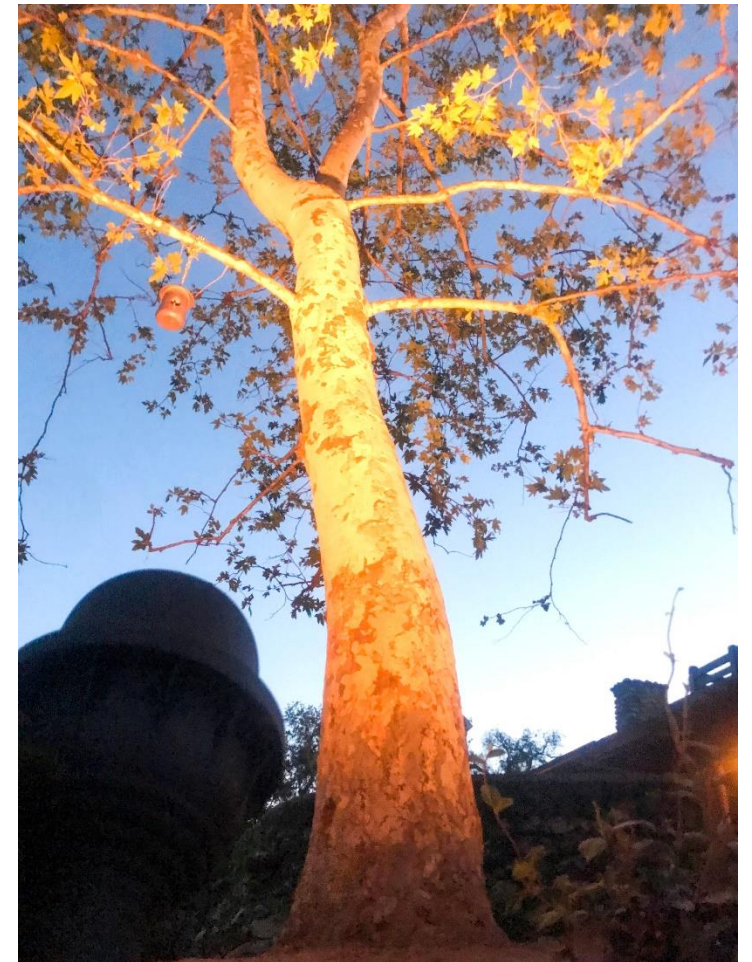
Summary

Automated landscape lighting systems, including Bluetooth and Wi-Fi options, provide numerous benefits for both lighting designers and homeowners.

These systems allow for seamless control via smartphones or tablets, enabling easy adjustments to create the perfect ambiance. With features like timers and programmable schedules, homeowners can enhance security and energy efficiency with minimal effort.

Additionally, a wide variety of compatible lighting fixtures is available, ensuring that designers can select the ideal options to meet specific aesthetic and functional needs.

Overall, automated systems offer flexibility, convenience, and sophistication, transforming outdoor spaces effortlessly.



Resources

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Thank You

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