



LIGHTING

for the Long Term

Good kitchen lighting becomes critical as we grow older, and smart technologies can help



BY DAVID K. WARFEL

We are in the midst of a lighting design revolution. The convergence of groundbreaking science and emerging technologies is changing our ideas about light's role in our everyday lives. We now understand how it influences our circadian rhythms, health, and mood, which is why regulating the amount and quality of light we are exposed to is important—especially as we age. In time, our lenses become less flexible, begin to discolor, and grow cloudy. This scatters light, increases our perception of glare, and makes distinguishing colors more difficult. Additionally, the muscles that control our pupils begin to lose strength, making them less responsive to changes in ambient lighting. We need to adjust accordingly. It's easy to add another lamp in the living room or put in a brighter bulb at a desk, but kitchen lighting is often fixed, so it's important to get it right the first time.

How light affects us

A few years ago, I heard a presentation by Mariana Figueiro, PhD, of the Lighting Research Center (LRC) at Rensselaer Polytechnic Institute, on the effects of light on human health. The LRC's findings show that the right light can help reduce the risk of falls, lessen macular degeneration and cloudiness, and even curtail dementia symptoms. Research scientists have also discovered that certain cells in our eyes send signals not to our visual cortex but to an entirely different part of our brain responsible for regulating our 24-hour days. This circadian rhythm entrains us to local time, and sequences the release of melatonin at night and cortisol in the morning; it also influences the rise and fall of our core body temperature. When we disrupt the rhythm, we suffer consequences that include interrupted sleep, increased memory

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RIGHT LIGHT, RIGHT PLACE

When putting together a long-term lighting plan for a kitchen, I make sure to spread out light to evenly illuminate the room and to lower the contrast. I also integrate brighter light where needed, and I find ways to orchestrate the system to maximum effect. It's a balancing act, but given the amount of time we spend and the number of activities we perform in our kitchens, it's important they be well lit.



IDEAL LIGHTING

PENDANT LIGHTS
Linear pendants create vertical reference points that can aid balance.

UNDER CABINETS
Color-changing light can help to regulate our circadian rhythms while providing smooth lighting on counters.

TOE KICKS

Lighted toe kicks are ideal when you want to increase the contrast between floors and cabinets to support an older person's stability and safety. They also reduce sleep-disrupting melanopic lux.

INSIDE CABINETS

Some manufacturers offer illuminated cabinet doors, but it's not hard to add LED strip tape to open-box units. These can be tied to door switches so that opening the cabinet activates the light.

DRAWERS

Lighting inside drawers is increasingly common and makes good sense, given the often-disorganized contents of many drawers.

CEILING COVES

Our retinas have a cluster of cells oriented to take in light signals from above—i.e., the sky. We can simulate that by bouncing light off the ceiling from coves—this creates indirect light that can change from crisp, cool white in midday to soft, warm amber in the evening. Indirect light reduces shadows and improves visibility.

COUNTERTOPS

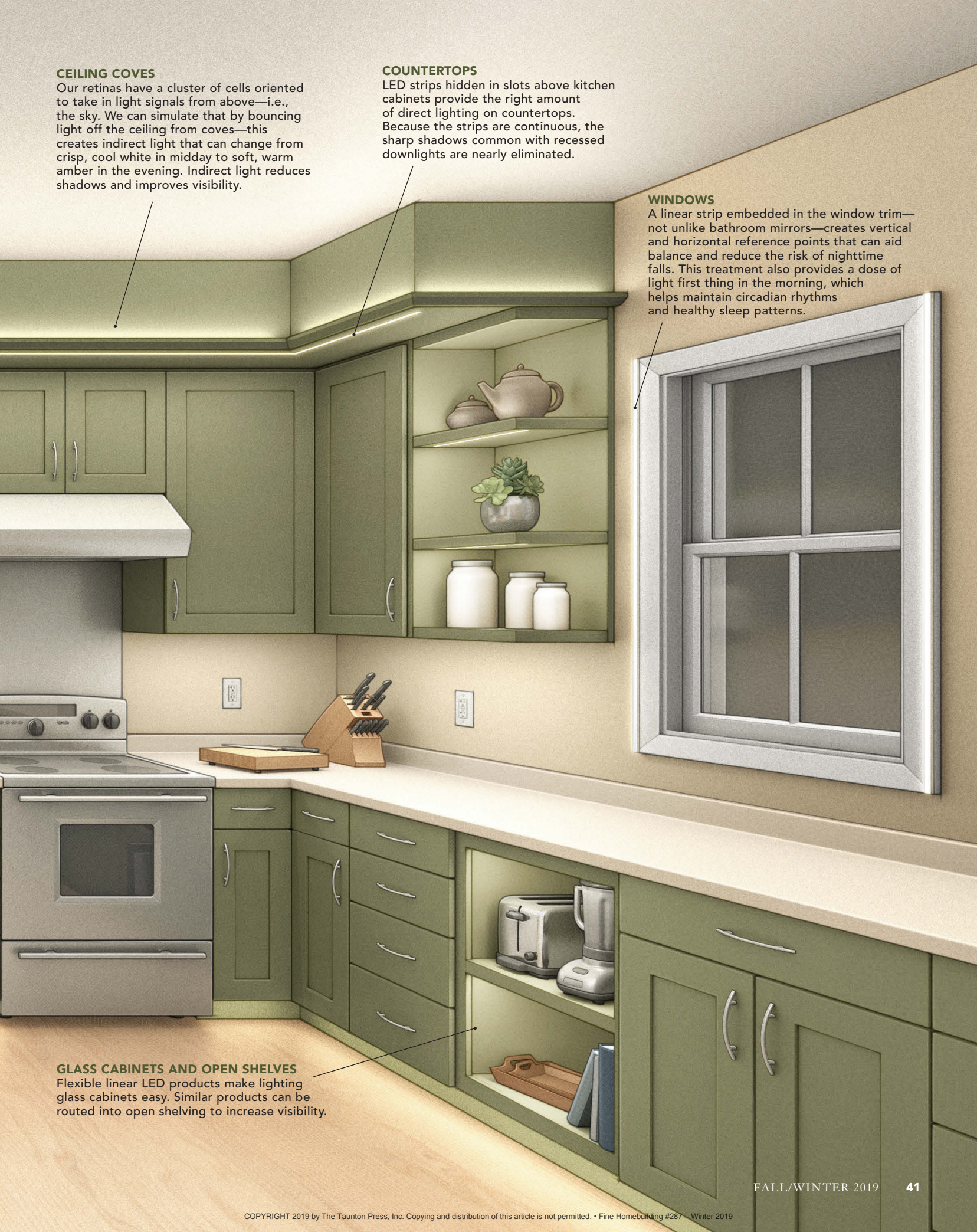
LED strips hidden in slots above kitchen cabinets provide the right amount of direct lighting on countertops. Because the strips are continuous, the sharp shadows common with recessed downlights are nearly eliminated.

WINDOWS

A linear strip embedded in the window trim—not unlike bathroom mirrors—creates vertical and horizontal reference points that can aid balance and reduce the risk of nighttime falls. This treatment also provides a dose of light first thing in the morning, which helps maintain circadian rhythms and healthy sleep patterns.

GLASS CABINETS AND OPEN SHELVES

Flexible linear LED products make lighting glass cabinets easy. Similar products can be routed into open shelving to increase visibility.



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loss, fatigue, and poor mood—all motivating factors for adding the right light.

Age determines lighting

The Illuminating Engineering Society, an international organization that develops lighting standards and recommendations, identifies three light-level options for residential kitchens: 250 lux, 500 lux, and 1000 lux. Each lux (a measurement of light) level corresponds with an age range. I am moving into the top half of the 25 to 65 range, which means I need 500 lux to see as well as my teenage sons, who need just 250 lux. And my aging parents need twice as much as I do. Aging in place means planning for the future, and light that works now will likely be insufficient later.

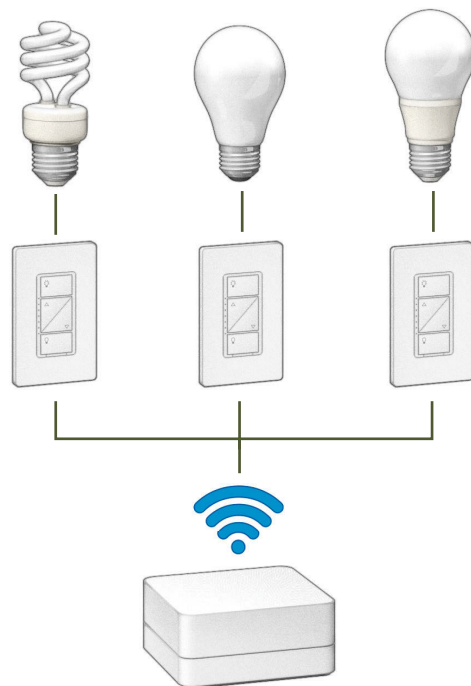
A new approach

We are just beginning to synchronize our indoor lighting with outdoor conditions, manipulating color and brightness to change in accordance with the time of day. For example, an LED strip embedded in window trim boosts melanopic lux, which is the brightness that reaches our retina and impacts our circadian rhythms. This augments natural light, even replacing it on cloudy days. Relatedly, soft, warm light prepares our bodies for sleep. Visual cues, such as the lines created where walls meet floors and ceilings, help us keep our balance. When the lights are out, those lines are much harder to see and the risk of falling increases. Solutions like laser lines in hallways and vertical strips in the bathroom can be beneficial. Of course, there are special considerations for kitchens. □

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ADDING SMART CONTROLS

My ideal age-in-place kitchen has a lot of lighting loads. There's indirect lighting, counter lighting, undercabinet lighting, toe-kick lighting, and lighting around the windows—plus, I'm likely to add pendants and other fixtures. That can mean a lot of switches, and I want everything to be on dimmers so the levels can be adjusted. I also want to limit brightness at night to minimize sleep disruption. Adjusting lighting all day long will be annoying at best, and I am unlikely to maintain the right patterns as my eyes change. This is where smart controls come in.



SMART SWITCHES

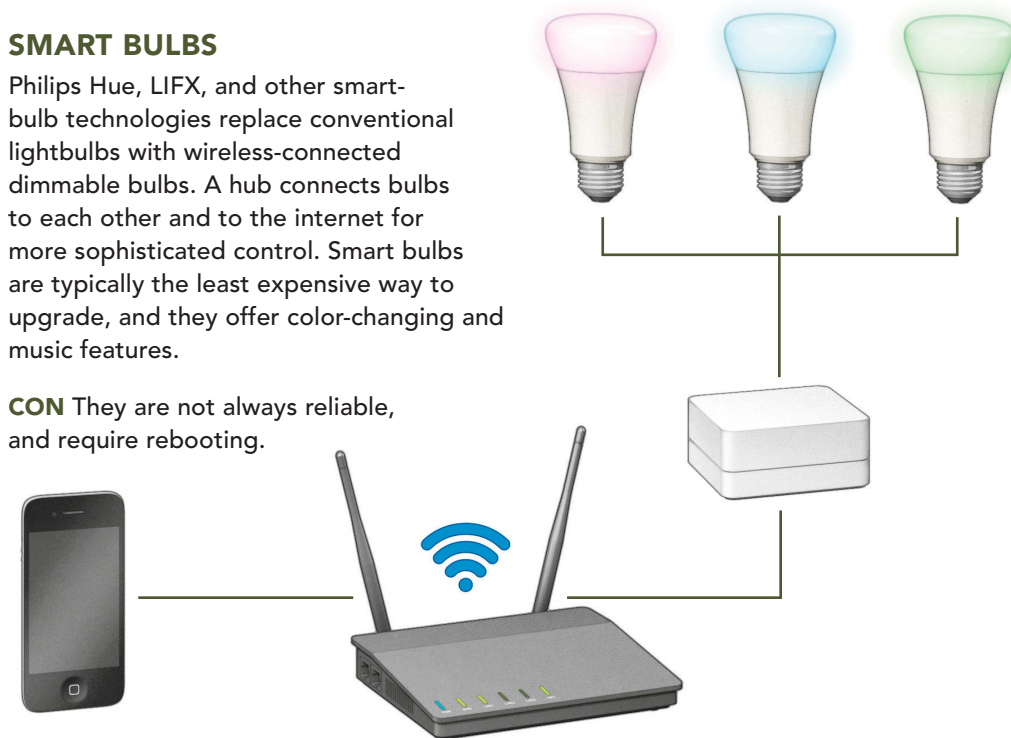
Smart switches work like switches with dimmers, with one exception: Each device is connected to the internet or to a hub allowing all devices to work together as a complete system. Smart switches can control incandescent, halogen, fluorescent, and LED lighting loads. Lutron's Caséta and RadioRA 2 are among the most reliable smart switches on the market. They are good for simple smart control of existing lamps and fixtures, and are generally easy to retrofit.

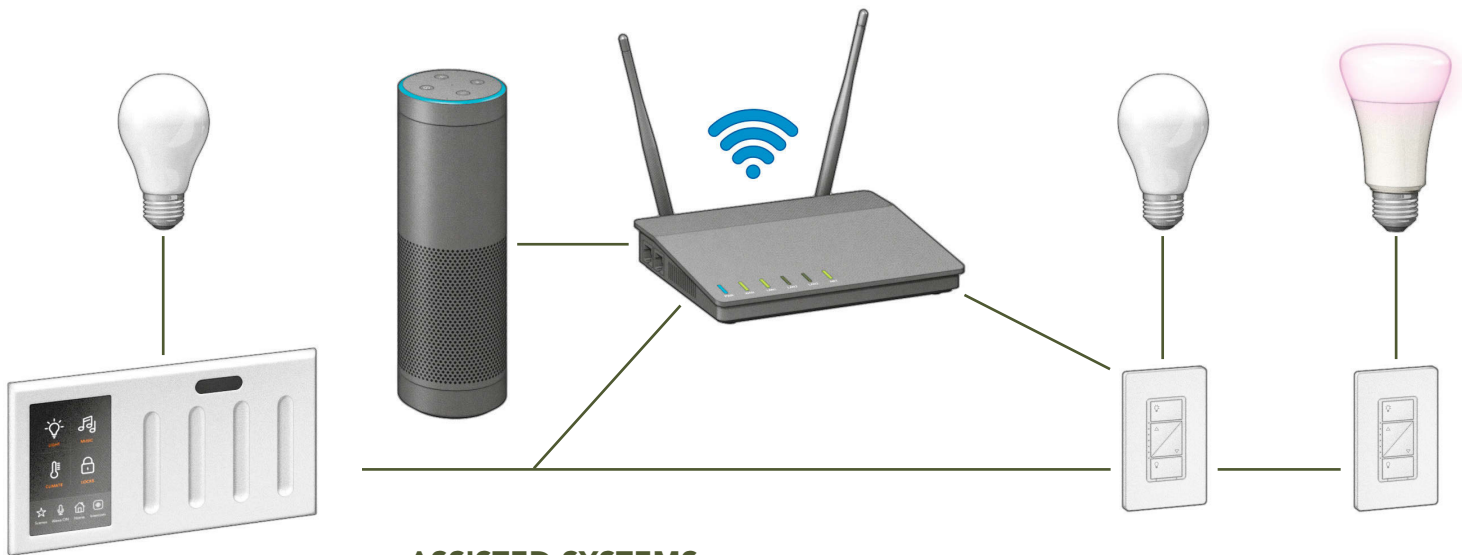
CON They don't work well with some LEDs, and they lack additional smart features such as color changing.

SMART BULBS

Philips Hue, LIFX, and other smart-bulb technologies replace conventional lightbulbs with wireless-connected dimmable bulbs. A hub connects bulbs to each other and to the internet for more sophisticated control. Smart bulbs are typically the least expensive way to upgrade, and they offer color-changing and music features.

CON They are not always reliable, and require rebooting.

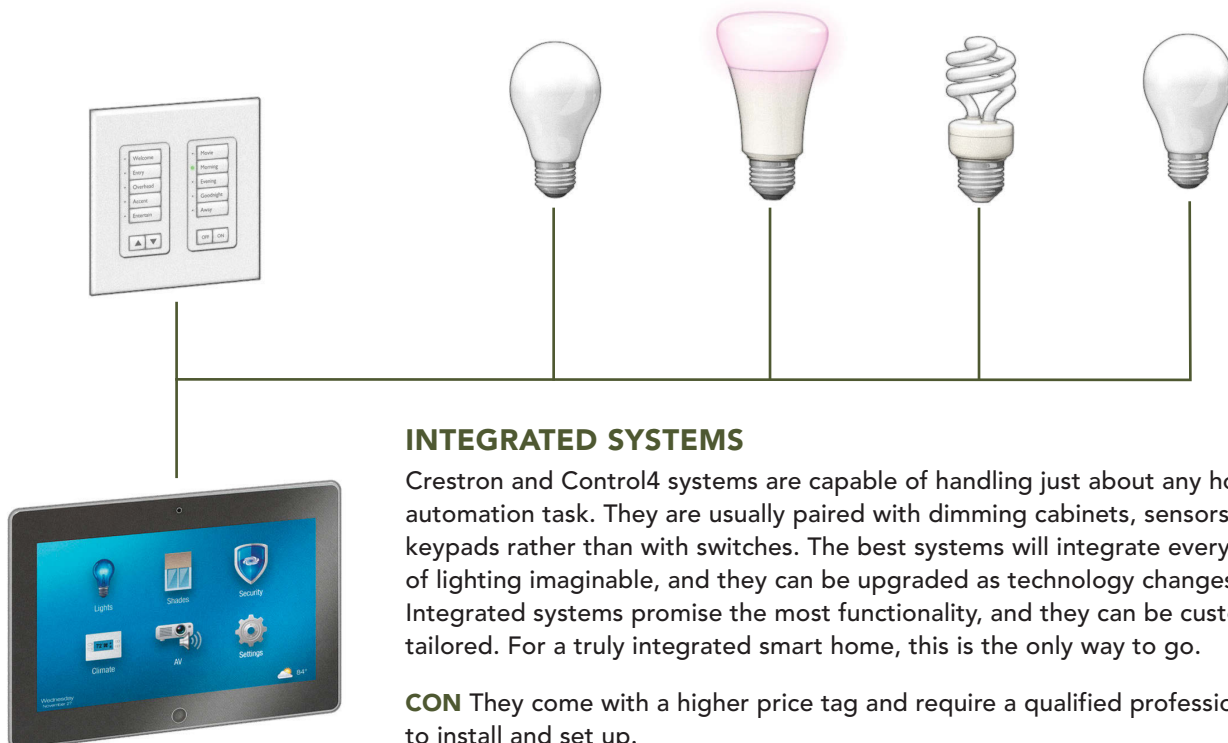




ASSISTED SYSTEMS

Amazon Alexa, Apple HomeKit, and Google Assistant are a few digital assistants that integrate with smart bulbs, smart switches, and other devices. New technologies include motion sensing and intercom communication. Most assisted systems have excellent functionality and can integrate door locks, cameras, and audio systems in addition to lights. Assisted systems make sense if you have a limited number of smart devices or want to control just the main living areas.

CON Some products have not been on the market long, and they can be complicated to set up. They often work best with a limited number of manufacturers, so check the details.



INTEGRATED SYSTEMS

Crestron and Control4 systems are capable of handling just about any home-automation task. They are usually paired with dimming cabinets, sensors, and keypads rather than with switches. The best systems will integrate every kind of lighting imaginable, and they can be upgraded as technology changes. Integrated systems promise the most functionality, and they can be custom-tailored. For a truly integrated smart home, this is the only way to go.

CON They come with a higher price tag and require a qualified professional to install and set up.