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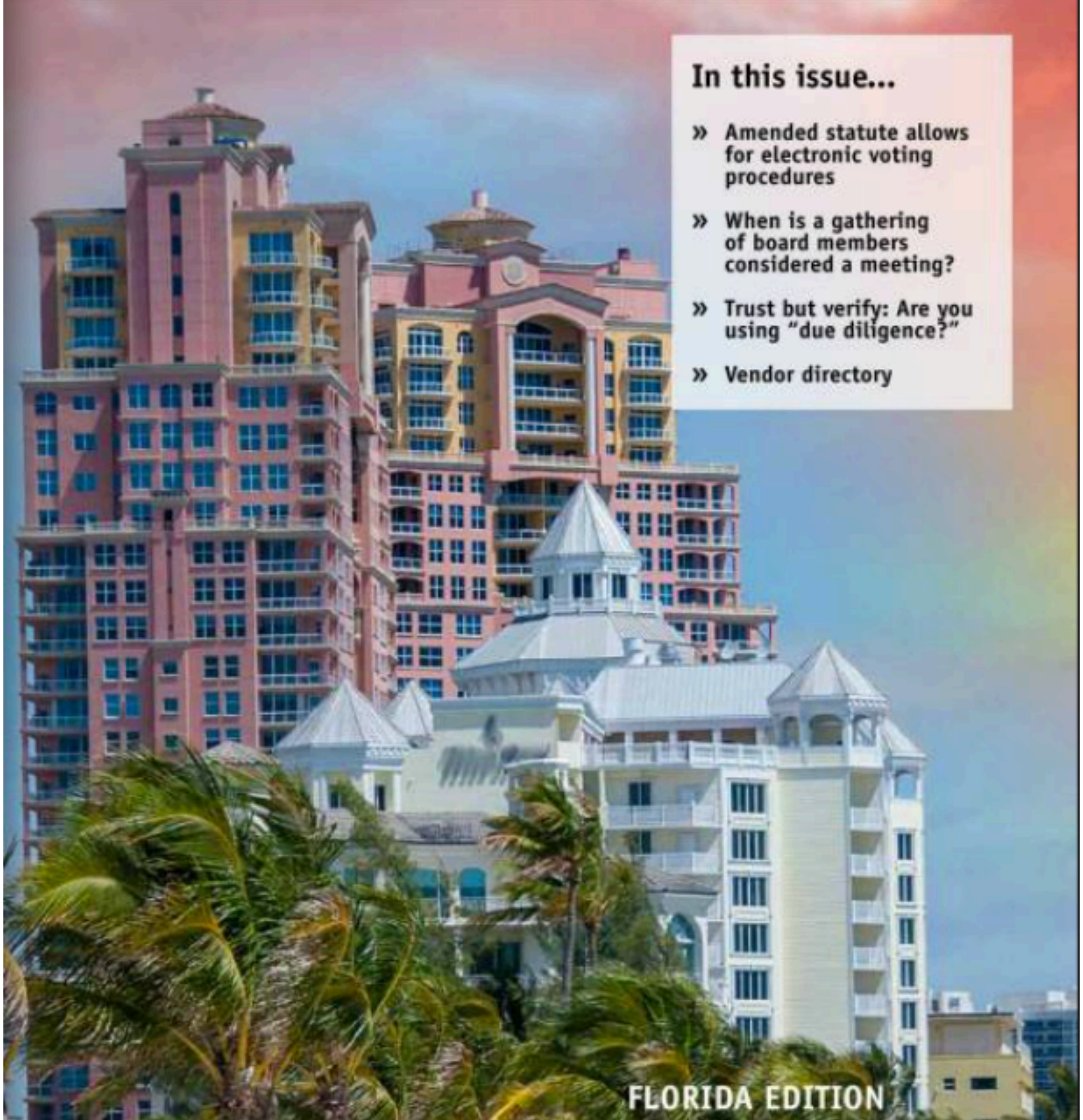
MANAGEMENT MAGAZINE



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By Neil Cannon

Modern LED technology has led the way to high efficiency lighting. With astonishing regularity LEDs are improved, costs are lowered and efficacy improves. To lighting product designers, meaningfully improved LED sources are available several times each year. with improved color consistency, color rendering and new optical distributions of white LEDs. Significantly improved lighting products now appear on the market in months rather than the years (or even decades) required for the incandescent and fluorescent technologies that proceeded LED. However, the rapid improvement blurs a more important characteristic of LED technology. LEDs are

LIGHTING'S INTEGRATED FUTURE - DO YOU SEE IT?

semiconductor devices, and as such, are low voltage devices that are easily incorporated with other semiconductors. LED lights and the attendant low voltage semiconductor electronics used therein form an ideal location in which other devices can be integrated.

Adding new capabilities to an LED light is similar to adding a digital camera to a cell phone. The cell phone already has a battery, a display, a charging port, a housing and integrated circuits that process and communicate images. All that is required is to add the photocell, the software, the lens and to hook those up to the cell phone (and of course, add an LED for the flash) in order to create a camera phone.

Adding features to LED lighting that encompass existing building sensory and control infrastructure can take advantage of the light's electrically-powered location and, crucially, its low voltage circuitry.

Lighting: Building Point of Convergence

Low voltage LED driver architecture creates an opportunity for technology and applications integration
Lights are ubiquitous, and have an advantaged position as an information-gathering point

The job of integrating all the now-separate building control and sensory functions into a light fixture may appear complex. For the building owners and for the contractors doing purchasing and maintenance, numerous separate systems is a highly inefficient use of money and resources. The devices themselves must each have a separate housing, power conversion and usually a communications network. LED lighting, in contrast, can be a "one stop shop" and the "Swiss Army knife" of building electronics.

Lighting is both the first required electrical device in a building and is ubiquitously deployed. Indoor light fixtures are often placed every 100 square feet or even more densely. Lighting's deployment within buildings makes the possibility of highly granular information-gathering a reality. Collecting information from sensors in such a dense deployment will provide new uses as yet unimagined.

The inventors of the Internet wanted only to share academic data between universities and were unlikely to have foreseen Facebook or Instagram. Similarly, the creators of networks that interconnect lights and sensors within buildings are unlikely to foresee all of the eventual uses of those networks and information. This represents a paradigm shift for an industry that has defined its primary charter as providing light fixtures, replacement bulbs and controls to adjust light levels and minimize energy use. Now experimentation in completely new areas will define the ways forward.

Lighting is one of the last technologies to undergo a change from bulk technologies, specific vacuum tube technology, to semiconductor technology. The radio was ungraded from vacuum tubes to transistors in the 1960's. The personal computer displaced the typewriter in the 1980's. However, being the latest technology to make use of semiconductors has one distinct advantage: the already built-up infrastructure to make, refine, cost reduce and interconnect sensors, high speed wireless integrated circuits and cloud-based storage. In addition, this new "Internet of Things," as it has been dubbed, utilizes the already in-place Internet. All of these necessary elements are in place and at the disposal of the lighting industry. It only takes clever engineers working within a corporate culture of innovation to create integrated products.

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The brief history of the iPhone

2007 : Original
Screen : 3.5" 163ppi
Storage : 4 GB, 8 GB
Network : Quad-Band GSM
Camera : 2.0 megapixel still

2009 : 3GS
Screen : 3.5" 163ppi
Storage : 16, 32 GB
Network : 3G + GPS Added
Camera : 3.0 mp
Still + Video

2011 : 4S
Screen : 3.5" 326ppi
Storage : 8, 16, 32, 64 GB
Network : 3G GSM + CDMA
Camera : Dual, 8.0mp back
Front : VGA

2012 : 5
Screen : 4" 326ppi
Storage : 16, 32, 64 GB
Network : 4G + LTE
Camera : Dual, 8 mp back
Front : 720p "FaceTime HD"

2014 : 6
Screen : 4.7" 326ppi
Storage : 16, 64, 128 GB
Network : 4G + LTE
Camera : Dual, 8 mp back
Front : 1080p insight