Lighting control system

Lighting control system

A lighting control system is intelligent network-based lighting control that incorporates communication between various system inputs and outputs related to lighting control with the use of one or more central computing devices. Lighting control systems are widely used on both indoor and outdoor lighting of commercial, industrial, and residential spaces. Lighting control systems are sometimes referred to under the term smart lighting. Lighting control systems serve to provide the right amount of light where and when it is needed.[1]

The term lighting controls is typically used to indicate stand-alone control of the lighting within a space. This may include occupancy sensors, timeclocks, and photocells that are hard-wired to control fixed groups of lights independently. Adjustment occurs manually at each devices location. The efficiency of and market for residential lighting controls has been characterized by the Consortium for Energy Efficiency.[2]

The term lighting control system refers to an intelligent networked system of devices related to lighting control. These devices may include relays, occupancy sensors, photocells, light control switches or touchscreens, and signals from other building systems (such as fire alarm or HVAC). Adjustment of the system occurs both at device locations and at central computer locations via software programs or other interface devices.

Lighting applications represents 19% of the world"s energy use and 6% of all greenhouse emissions.[4] In the United States, 65 percent of energy consumption is used by commercial and industrial sectors, and 22 percent of this is used for lighting.

A smart lighting system can ensure that dark areas are illuminated when in use. The lights actively respond to the activities of the occupants based on sensors and intelligence (logic) that anticipates the lighting needs of an occupant.

Lights can be used to dissuade those from areas they should not be. A security breach, for example, is an event that could trigger floodlights at the breach point. Preventative measures include illuminating key access points (such as walkways) at night and automatically adjusting the lighting when a household is away to make it appear as though there are occupants.

Solar time schedules incorporate sunrise and sunset times, often used to switch outdoor lighting. Solar time scheduling requires that the location of the building be set. This is accomplished using the building"s geographic location via either latitude and longitude or by picking the nearest city in a given database giving the approximate location and corresponding solar times.

Space occupancy is primarily determined with occupancy sensors. Smart lighting that utilizes occupancy

sensors can work in unison with other lighting connected to the same network to adjust lighting per various conditions.[6] The table below shows potential electricity savings from using occupancy sensors to control lighting in various types of spaces.[7]

The advantages of ultrasonic devices are that they are sensitive to all types of motion and generally there are zero coverage gaps, since they can detect movements not within the line of sight.[8][7]

Electric lighting energy use can be adjusted by automatically dimming and/or switching electric lights in response to the level of available daylight. Reducing the amount of electric lighting used when daylight is available is known as daylight harvesting.

Alarm conditions typically include inputs from other building systems such as the fire alarm or HVAC system, which may trigger an emergency "all lights on" or " all lights flashing" command for example.

Program logic can tie all of the above elements together using constructs such as if-then-else statements and logical operators. Digital Addressable Lighting Interface (DALI) is specified in the IEC 62386 standard.