

How it works.

LED lights are continuously growing in popularity for their durability and environmentally friendly properties. As a result, LEDs have slowly started to replace previous lighting solutions, including compact fluorescent lamps, CFLs, and halogen lights.

The typical LED light fixture consists of two components: the LED lights and an LED driver, sometimes referred to as a transformer. These LEDs can be arranged as Chips-On-Board (COB) or as a series of little LEDs linked together on a printed circuit board.

Despite the simplicity of LED lights, they can be additionally modified to advance its capabilities. One popular modification is incorporating the LEDs with a dimming system. Dimmable LED lights have several benefits, such as creating a comfortable ambiance to reduce eye strain, lowering power consumption, generating less heat emitted from the lights, and prolonging the life span of each LED unit. There are various kinds of LED dimming methods currently available on the market. A majority of LED lights are compatible with traditional triac dimmers. Other dimming methods are the analog 0-10V, pulse width modulation (PWM), and Digital Addressable Lighting Interface (DALI).

Amptek's Solution

Amptek Technologies has developed an IoT solution for LED lights. This solution allows multiple LED lights to communicate with each other through Bluetooth to create a zone of LEDs. Multiple zones can be created to customize a full LED network. Amptek's innovative solution of intercommunicating lights means that the size of each zone, and therefore the size of the LED network, has no limits – no network is too large. Creating the network is all done through the mobile app.

On the mobile app, a number of additional capabilities are available. This includes scheduling the light activity to dictate when the user's lights from different zones can power on or off at varying light intensities. Scheduling alarms can be set to the minute and on certain days of the week. Moreover, users can adjust the brightness of zones to have different areas lit at different intensities.

The System

Amptek's IoT light dimming system consists of one iCon and one Bluetooth Low Energy Dimmer for each LED light.

The iCon is the centre of the system. It is a wireless control hub that handles all network management processes, scheduling, and dimmer communication. All commands performed on the mobile app by the user is wirelessly sent to the iCon, which then sends the messages to the correct BLE Dimmers.

BLE Dimmers are each attached to an LED light unit. When a user creates a zone, they essentially group together multiple dimmers. Dimmers listen to messages from the iCon, change the dimming signal (0-10V), and propagate these messages to other BLE Dimmers within their respective zone.

The Specs

The iCon's simple box design measures 109mm long, 60.9mm wide, and 28.5mm thick. A 5VDC power supply is all that is needed to get the unit up and running. Setting up the system is all done through the mobile app. The USB connector is not for powering; it is only to be used in the event of a required software upgrade. Both Wi-Fi and Bluetooth antennas are embedded inside the iCon. Two status lights, orange and green, are provided to indicate the operating status of the device.

The initial iCon setup requires the device to be paired with the mobile app through Bluetooth at the beginning. The user then enters the Wi-Fi network information under the "Setup" page within the app. Once the setup is completed, all operations will go through the Wi-Fi network automatically.

The BLE Dimmer measures 100mm long, 50mm wide, 25.5mm thick, and weighs only 76 grams. This device operates at 100-375VAC, and is therefore suitable for any lighting applications including industrial lights. In addition, its IP55 rating allows the device to be used in indoor and outdoor environments. During operation, the dimmer listens to encrypted messages coming from the iCon and nearby BLE dimmers and outputs a 0-10VDC voltage to the dimmable LED driver attached to it.

Care must be taken when choosing the LED driver. There are a large number of 0-10V dimmable LED drivers available on the market. However, not all drivers have a "dim-to-off" capability. For drivers that do not support "dim-to-off" capabilities, the LED will remain dimmed at about 5-10% when the dimmer control voltage is at its minimum. Users must flip the power switch off in order to completely turn off the light. However, for this LED drivers that do support "dim-to-off", the LED light will be turned completely off whenever the dimmer control voltage is below 1VDC (in most cases).

