

WHAT IS CLAIMED IS:

1. A Light-Emitting Diode (LED) apparatus comprising:
at least one LED display module, each LED display module comprising a plurality of LEDs and at least one communication unit; and
a gateway functionally coupled to the at least one communication unit, the gateway being configured for wirelessly receiving one or more commands for controlling the LED apparatus and in response to the received one or more commands, sending one or more instructions to the at least one communication unit wirelessly or via a direct current (DC) power line for controlling the lighting of the plurality of LEDs.
2. The LED apparatus of claim 1, wherein each LED display module further comprises a plurality of LED display submodules, each LED display submodule comprising a subset of the plurality of LEDs.
3. The LED apparatus of claim 2, wherein each LED display module comprises a plurality of communication units; and wherein each of the plurality of LED display submodules comprises one of the plurality of communication units.
4. The LED apparatus of claim 2, wherein each LED display module comprises only one communication unit.

5. The LED apparatus of any one of claims 2 to 4, wherein each LED submodule further comprises a control unit in signal communication with the at least one communication unit and configured for controlling the lighting of the plurality of LEDs in the LED submodule.
6. The LED apparatus of any one of claims 1 to 5, wherein the at least one LED display module comprises a flexible display surface configurable to a nonplanar display surface.
7. The LED apparatus of any one of claims 1 to 6, wherein the power line has a voltage of about 48V.
8. The LED apparatus of any one of claims 1 to 7, wherein the gateway is configured for communication with the at least one communication unit via the DC power line; and wherein the at least one communication unit comprises a low-pass filter (LPF) for filtering the electrically current of the DC power line for reducing interference and/or noises.
9. The LED apparatus of any one of claims 1 to 8, wherein the at least one communication unit further comprises a data acquisition component for collecting data of the LEDs and for adjust the lighting of the LEDs.
10. The LED apparatus of claim 9, wherein the at least one communication unit further comprises a communication component functionally coupled to the data acquisition component for transmitting data to and from the data acquisition component.

11. A LED display module comprising:
- a plurality of LED display submodules, each LED display submodule comprising one or more LEDs;
 - a communication hub configured for communication with the plurality of LED display submodules for adjusting the lighting of the one or more LEDs thereof; and
 - a gateway configured for communication with the communication hub and for wireless communication with one or more computing devices.
12. The LED display module of claim 11 further comprising:
- a flexible housing structure comprising a plurality of pockets for receiving therein the plurality of LED display submodules and a central pocket for receiving the communication hub.
13. The LED display module of claim 11 or 12, wherein the communication hub is a wireless communication hub for wireless communication with the gateway.
14. The LED display module of claim 11 or 12, wherein the communication hub is a wired communication hub for communication with the gateway via a DC power line.
15. The LED display module of claim 14, wherein the DC power line has a voltage of about 48V.

16. The LED display module of claim 14 or 15, wherein the communication hub comprises a low-pass filter (LPF) for filtering the electrically current of the DC power line for reducing interference and/or noises.

17. The LED display module of any one of claims 14 to 16, wherein the communication hub further comprises a data acquisition component for collecting data of the LEDs and for adjust the lighting of the LEDs.

18. The LED display module of claim 17, wherein the communication hub further comprises a communication component functionally coupled to the data acquisition component for transmitting data to and from the data acquisition component.