

We claim:

1. A battery management system comprising:

a plurality of batteries each comprising a positive terminal and a negative terminal, wherein the positive or negative terminal of each of the plurality of batteries is coupled to the positive or negative terminal of another one of the plurality of batteries;

a monitoring board connected to the positive terminal and the negative terminal of at least one of the plurality of batteries; and

a controller connected to the monitoring board through the positive terminals and the negative terminals of the plurality of batteries, wherein the monitoring board is configured to monitor a status of the at least one battery and transmit one or more battery parameters of the at least one battery to the controller, and wherein the controller is configured to receive the transmitted battery parameters, the controller further configured to adjust performance of the plurality of batteries based on the one or more battery parameters.

2. The battery management system of claim 1 comprising a plurality of the monitoring boards respectively corresponding to the plurality of batteries, wherein the positive and negative terminals of each of the plurality of batteries are coupled to the corresponding one of the plurality of monitoring boards.

3. The battery management system of claim 1, wherein a predetermined number of the plurality of batteries are connected in series, and wherein the controller and the positive terminals and the negative terminals of the monitoring board corresponding to the predetermined number of the plurality of batteries are connected in one closed loop.

4. The battery management system of claim 1, wherein the controller is configured to communicate with the monitoring board through the positive terminals and the negative terminals of the plurality of batteries.

5. The battery management system of claim 1, wherein the monitoring board is individually addressable by the controller.

6. The battery management system of claim 1, wherein the plurality of batteries are connected in parallel and in series.
7. The battery management system of claim 1, wherein the controller board comprises an isolator circuit configured to block direct current (DC) voltage from the one or more batteries.
8. The battery management system of claim 1, wherein the monitoring board is configured to measure at least one of voltage, resistance, temperature, discharge and charge limits, or health of the one or more batteries.
9. The battery management system of claim 1, wherein the monitoring board is configured to transmit data associated with a status of the connected battery through a digitally modulated signal combined with DC voltage.
10. A vehicle power system for providing motive power to a vehicle, comprising:
 - a motor for providing motive power;
 - a plurality of batteries for providing power to the motor; and
 - the battery management system of claim 1 to monitor a status of the plurality of batteries.
11. A battery management method comprising:
 - receiving a modulated data signal offset by a DC voltage;
 - removing the DC voltage to extract the modulated data signal;
 - conditioning the modulated data signal to remove noise;
 - demodulating the modulated data signal to extract a bitstream containing a data packet;
 - decoding the data packet to parse a message regarding one or more parameters of a battery; and
 - outputting the one or more parameters of the battery.
12. The battery management method of claim 11, wherein the one or more parameters represent status information of the battery.

13. The battery management method of claim 11, wherein the one or more parameters is traceable back to the battery among two or more other batteries from which the modulated data signal originated.
14. The battery management method of claim 11, further comprising:
analyzing the data packet to identify an address from which the modulated data signal originated.
15. The battery management method of claim 11, wherein conditioning the modulated data signal comprises shaping the modulated data signal to a predetermined logic level.
16. The battery management method of claim 11, wherein the modulated data signal is modulated using an on-off keying scheme.
17. A battery management method comprising:
generating a message regarding one or more parameters of a battery;
encoding the message into a data packet for serial communication;
converting the data packet into a bitstream;
modulating the bitstream to generate a modulated data signal;
conditioning the modulated data signal to remove distortion; and
injecting the modulated data signal onto a DC voltage line,
wherein the DC voltage line is coupled to power an electrical motor.
18. The battery management method of claim 17, wherein the modulated data signal comprises one or more modulated portions corresponding to a logic low bit or one or more non-modulated portions corresponding to a logic high bit.
19. The battery management method of claim 17, wherein the modulated data signal comprises one or more highly-modulated portions corresponding to a logic high bit or one or more regularly-modulated portions corresponding to a logic low bit.
20. The battery management method of claim 17, wherein modulating the bitstream comprises:
generating a carrier signal of a predetermined frequency; and

outputting the carrier signal based on a logic state of the bitstream.