CLAIMS

1. A system (115) for balancing a plurality of cells (110) arranged within a battery pack (105), the system (115) comprising:

a plurality of sensors (210) electrically coupled to the plurality of cells (110) to measure multiple operational parameters of each of the plurality of cells (110);

a switching unit (215) electrically coupled to each of the plurality of cells (110); and

a controlling unit (235) communicably coupled to each of the plurality of sensors (210) and the switching unit (215), the controlling unit (235) configured to:

determine an energy value ($E_{(cell-n)}$) for each of the plurality of cells (110) based on data pertaining to the multiple operational parameters of each of the plurality of cells (110);

determine, based on the energy value ($E_{(cell-n)}$), an energy delta (D_n) for each of the plurality of cells (110); and

selectively operate the switching unit (215) for a time period (t_n), the time period (t_n) determined based on the energy delta (D_n) for each of the plurality of cells (110) to allow transfer of energy from at least one of the plurality of cells (110) to a storage unit (120), wherein subsequent to transfer of energy, each of the plurality of cells (110) is at an ideal operating state and the plurality of cells (110) are balanced,

wherein energy transferred from at least one of the plurality of cells (110) to the storage unit (120) is utilized to provide energy to a load (125) directly.

2. The system (115) as claimed in claim 1, wherein the energy delta (D_n) is a difference between the energy value ($E_{(cell-n)}$) of each of the plurality of cells (110) and a minimal energy value ($E_{(cell-min)}$) of at least one of the plurality of cells (110).

3. The system (115) as claimed in claim 1, wherein the ideal operating state is achieved when a voltage delta (VDn) of each of the plurality of cells (110) is lesser than a threshold value, the voltage delta (VDn) is a difference

between a voltage value ($V_{(cell-n)}$) of each of the plurality of cells (110) and a minimal voltage value ($V_{(cell-min)}$) of at least one of the plurality of cells (110).

4. The system (115) as claimed in claim 3, wherein the threshold value pertains to a voltage range determined based on a type of the plurality of cells (110).
5. The system (115) as claimed in claim 1, wherein each of the plurality of cells (110) is electrically coupled to each other in one of a series connection, a parallel connection, or a combination thereof.
6. The system (115) as claimed in claim 1, wherein the multiple operational parameters correspond to at least one of current, voltage, and temperature of each of the plurality of cells (110).
7. The system (115) as claimed in claim 1, wherein the storage unit (120) is at least one of a battery pack, or a capacitor.
8. The system (115) as claimed in claim 1, wherein the switching unit (215) is at least one of a switch, a transistor, or a MOSFET.
9. The system (115) as claimed in claim 1, wherein the controlling unit (235) selectively operates the switching unit (215) for the determined time period (tn) based on at least one of a voltage set point ($VS_{(cap-n)}$) of the storage unit (120), an equivalent resistance/ON-state resistance of the switching unit (215), or a combination thereof.
10. A method (500) of balancing a plurality of cells (110) arranged within a battery pack (105), the method (500) comprising:

determining an energy value ($E_{(cell-n)}$) for each of the plurality of cells (110) based on data pertaining to multiple operational parameters of each of the plurality of cells (110);

determining, based on the energy value ($E_{(cell-n)}$), an energy delta (D_n) for each of the plurality of cells (110);

determining, based on the energy delta (D_n), a time period (t_n) to operate a switching unit (215); and

selectively operating the switching unit (215) for the time period (t_n) to allow transfer of energy from at least one of the plurality of cells (110) to a storage unit (120), wherein subsequent to transfer of energy, each of

the plurality of cells (110) is at an ideal operating state and the plurality of cells (110) are balanced,

wherein energy transferred from at least one of the plurality of cells (110) to the storage unit (120) is utilized to provide energy to a load (125) directly.

11. The method (500) as claimed in claim 11, wherein the energy delta (Dn) is a difference between the energy value ($E_{(cell-n)}$) of each of the plurality of cells (110) and a minimal energy value ($E_{(cell-min)}$) of at least one of the plurality of cells (110).
12. The method (500) as claimed in claim 11, wherein the ideal operating state is achieved when a voltage delta (VD_n) of each of the plurality of cells (110) is lesser than a threshold value, the voltage delta (VD_n) is a difference between a voltage value ($V_{(cell-n)}$) of each of the plurality of cells (110) and a minimal voltage value ($V_{(cell-min)}$) of at least one of the plurality of cells (110).
13. The method (500) as claimed in claim 11, wherein selectively operating the switching unit (215) for the determined time period (t_n) is based on at least one of, a voltage set point ($VS_{(cap-n)}$) of the storage unit (120), an equivalent resistance/ON-state resistance of the switching unit (215), or a combination thereof.
14. A battery pack (105) comprising:

a plurality of cells (110) arranged within the battery pack (105);

a plurality of sensors (210) electrically coupled to the plurality of cells (110) to measure multiple operational parameters of each of the plurality of cells (110);

a switching unit (215) electrically coupled to each of the plurality of cells (110); and

a controlling unit (235) communicably coupled to each of the plurality of sensors (210) and the switching unit (215), the controlling unit (235) configured to:

receive data, from the plurality of sensors (210) pertaining to the operational parameters of each of the plurality of cells (110);

determine a plurality of energy values ($E_{(cell-n)}$) based on data pertaining to the multiple operational parameters of each of the

plurality of cells (110), wherein each of the plurality of energy values ($E_{(cell-n)}$) corresponds to one of the plurality of cells (110);

select, a minimal energy value ($E_{(cell-min)}$) from the plurality of determined energy values;

determine, based on the minimal energy value ($E_{(cell-min)}$), an energy delta (D_n) for each of the plurality of cells (110), the energy delta (D_n) is a difference between the energy value ($E_{(cell-n)}$) of each cell and the minimal energy value ($E_{(cell-min)}$);

determine, based on the energy delta (D_n), a time period (t_n) for operating the switching unit (215); and

selectively operate the switching unit (215) for the determined time period (t_n) to allow transfer of energy from each of the plurality of cells (110) to a storage unit (120), wherein subsequent to transfer of energy, each of the plurality of cells (110) is at an ideal operating state and the plurality of cells (110) are balanced, wherein the ideal operating state is achieved when a voltage delta (VD_n) of each of the plurality of cells (110) is lesser than a threshold value,

wherein energy transferred from at least one of the plurality of cells (110) to the storage unit (120) is utilized to provide energy to a load (125) directly.