Claims

1. A residential energy consumption monitoring system for monitoring energy consumption in a residential premise, the residential energy consumption monitoring system comprising:

a smart distribution board (DB~~), at least one conventional socket outlet and at least one smart socket outlet, the smart DB~~) comprising:

a plurality of miniature circuit breakers (MCBs);

a metering board having a plurality of metering ~~channels~~devices, each metering ~~channel~~ device is ~~connected to one circuit with a miniature circuit breakers (MCBs) and~~ configured to obtain ~~frequency (Hz), current (A), and voltage (V),~~data associated with energy consumption ~~(Wh), power (W), harmonics,~~ drawn from one of the MCBs,

a DB processing unit configured to receive the data from the metering board; and

~~,~~a direct current power supply for driving the DB processing unit; and

at least one smart socket outlet communicatively connected to the smart DB, the at least one smart socket outlet comprising:

a live inlet connected to one of the MCBs~~,~~;

a neutral inlet~~,~~;

a metering device configured to obtain ~~frequency (Hz), current (A), and voltage (V)~~data associated with energy consumption drawn from the live and neutral inlets~~,~~ ; and

an outlet processing unit configured to receive the data from the metering device of the at least one smart socket outlet and transmit a data package comprising the data from the metering ~~devices~~device of the at least one smart socket outlet to the DB processing unit~~; and~~ ,

wherein ~~the outlet processing unit is communicatively connected to the DB processing unit.~~ at least one of the MCBs is connected to a live inlet of at least one conventional socket outlet and the at least one smart socket outlet.

2. The residential energy consumption monitoring system according to claim 1, wherein the at least one conventional socket outlet and the at least one smart socket outlet that are connected to the at least one of the MCBs are provided in one location within the residential premise~~one of the MCBs connected to the live inlet further connects to a live inlet of the at least one conventional socket outlet~~.

3. The residential energy consumption monitoring system according to claim 1 or ~~claim~~ 2, wherein the DB processing unit comprises a DB processor, a DB memory and DB instructions stored on the DB memory and executable by the DB processor to:

receive a signature list containing electric load signatures of top N number of common appliances from a main server;

store the signature list in the DB memory; and

commence data collection from the metering board and the at least one smart socket outlet.

4. The residential energy consumption monitoring system according to claim 3, wherein the DB ~~instruction~~instructions to commence data collection from the metering board and the at least one smart socket outlet comprises ~~DB~~ instructions to:

establish connection with the at least one ~~the~~ smart socket outlet;

update details in a configuration file stored on the DB memory containing information with respect to ~~connected~~the at least one smart socket outlet that is connected, the details being a type of connectivity to connect with the at least one smart socket outlet;

obtain data from the metering board, the data comprising frequency, voltage, and current; and

receive a data package from the at least one smart socket outlet, the data package comprising frequency, voltage, and current.

5. The residential energy consumption monitoring system according to claim 4, wherein the configuration file further comprises a protection threshold AC voltage, a protection threshold current and a protection threshold temperature.

6. The residential energy consumption monitoring system according to claim 5, wherein the smart DB further comprises on/off switch for switching on or off each of the MCBs, and the DB ~~instruction~~instructions to commence data collection from the metering board and the at least one smart socket outlet further comprises ~~DB~~ instructions to:

switch off the MCB in response to one of the rules comprising: AC voltage being above the protection threshold AC voltage, current being above the protection threshold current and temperature being above the protection threshold temperature.

7. The residential energy consumption monitoring system according to claim 4, wherein the DB ~~instruction~~instructions to commence data collection from the metering board and the at least one smart socket outlet further comprises ~~DB~~ instructions to:

identify a type of load drawing from the MCBs and smart socket outlet by matching the electric load signatures in the signature list with an electric signature generated by ~~the~~a load drawing from the MCBs and smart socket outlet; and

transmit a DB data package to the main server, the DB data package comprising the data obtained from the at least one smart socket outlet and the metering board wherein the identified type of load is indicated to the respective MCBs and smart socket outlet.

8. The residential energy consumption monitoring system according to claim 7, further comprising the main server, the main server having a processor, a memory and instructions stored on the memory and executable by the processor to:

receive the DB data package from the smart DB;

determine a type of load in response to receiving an undetermined load from the DB data package; and

store the DB data package and update a data structure associated to the smart DB and wherein the memory further comprises a signature list containing electric load signatures of a plurality of appliances.

9. The residential energy consumption monitoring system according to claim 8, wherein the instruction to determine the type of load in response to receiving the undetermined load from the DB data package comprises instructions to:

compare an electric load signature of the undetermined load with the electric load signatures in the signature list;

in response to a match, identify an appliance associated to the matched electric load signature and send a notification to ~~the~~a user to confirm the identified appliance; and

in response to receiving a confirmation from ~~the~~a user, transmit a revised signature list to the smart DB, the revised signature list containing the electric load signatures of top N number of common appliance and the identified appliance.

10. The residential energy consumption monitoring system according to claim 8, wherein the instructions of the main server further comprise instructions to:

receive a request to amend a data structure associated to one of a plurality of the smart DBs;

amend the data structure according to the request; and

store the amended data structure.

11. The residential energy consumption monitoring system according to claim 10, wherein the instruction to amend the data structure according to the request further comprises instructions to:

in response to the request to include a new appliance to a connected load, amend the data structure associated to the smart DB to include the new appliance against the MCBs or the at least one smart socket outlet accordingly.

12. The residential energy consumption monitoring system according to claim 11, wherein the instruction to amend the data structure according to the request further comprises instructions to:

amend the signature list to include an electric load signature associated to the new appliance.

13. The residential energy consumption monitoring system according to claim 12, wherein the instruction to amend the data structure according to the request further comprises instructions to:

update an order of the electric load signatures in the signature list.

14. The residential energy consumption monitoring system according to claim 13, wherein the instruction to update an order of the electric load signatures in the signature list comprises instructions to:

update a score to each electric load signature, the score being the number of data structures containing the same electric load signature; and

arrange the electric load signatures in ascending order where the highest score will be arranged at the top and the lowest score will be arranged at the bottom of the signature list.

15. The residential energy consumption monitoring system according to ~~anyone~~any one of claims 1 to 14, wherein the outlet processing unit of the at least one smart socket outlet comprises an outlet processor, an outlet memory and outlet instructions stored on the outlet memory and executable by the outlet processor to:

establish connection with the smart DB;

obtain data from the metering device of the at least one smart socket outlet, the data comprising frequency, voltage, current, and temperature; and

transmit an outlet data package to the smart DB, the outlet data package comprising the data obtained from the metering device of the at least one smart socket outlet, wherein the metering device of the at least one smart socket outlet is further configured to obtain temperature.

16. The residential energy consumption monitoring system according to claim 15, wherein the at least one smart socket outlet further comprises:

an on/off button configured to switch the outlet processing unit between a smart mode and a conventional mode;

a reset button configured to activate a hardware reset to the outlet processing unit;

a paring button configured to activate a pairing between the outlet processing unit with the DB processing unit;

a connectivity indicator to indicate whether the outlet processing unit is in communication with the DB processing unit;

an alarm indicator to indicate whether there is an issue with the outlet processing unit; and

an on/off switch configured to switch on or off the at least one smart socket outlet.

17. The residential energy consumption monitoring system according to claim 16, wherein the at least one smart socket outlet further comprises a configuration file having a protection threshold AC voltage, a protection threshold current and a protection threshold temperature.

18. The residential energy consumption monitoring system according to claim 17, wherein the outlet instruction to obtain data from the metering device of the at least one smart socket outlet further comprises outlet instructions to:

switch the on/off switch to off in response to one of the rules comprising: AC voltage being above the protection threshold AC voltage, current being above protection threshold current and temperature being above the protection threshold temperature.

19. The residential energy consumption monitoring system according to ~~anyone~~claim 6 or 16, wherein the on/off switch of the smart DB or the on/off switch of the at least one smart socket outlet is configured to be switched on or off remotely by a user.

20. The residential energy consumption monitoring system according to any one of claims 1~~-18~~ to 19, wherein the metering device is one of or a combination of voltmeter, ammeter, power energy meter and thermistor.