(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
9 August 2012 (09.08.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/106252 A4

(51) International Patent Classification:
H02J 3/14 (2006.01)

(21) International Application Number:
PCT/US2012/023155

(22) International Filing Date:
30 January 2012 (30.01.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/438,179 31 January 2011 (31.01.2011) US
61/591,035 26 January 2012 (26.01.2012) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

— *with amended claims (Art. 19(1))*

Date of publication of the amended claims: 27 September 2012

(54) **Title**: ENERGY INTERFACE SYSTEM

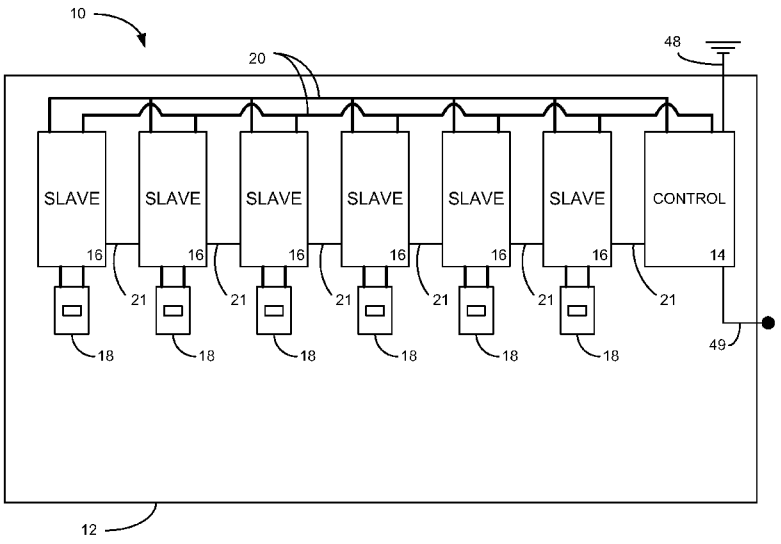

FIG. 4

(57) **Abstract**: Aspects of the present disclosure involve systems, methods, and the like, for an energy interface system for interfacing alternative energy sources with a utility power source on a premises. The energy interface system provides flexibility in the use and distribution of utility energy sources and alternative energy sources based on several measurements and criteria of the interface system. For example, the energy interface system may allow for the energy consumption to adapt to changing parameters, such as utility rate schedules, cost of alternative fuels and utility premiums for consumption or generation of energy at particular times. The energy interface system also allows for deferment of charging or other high-energy loads to be recognized by the system at otherwise low-energy times. In addition, the energy interface system allows for monitoring and communication with the system for ease of configuring the system based on one or more criteria or measurements.

WO 2012/106252 A4

AMENDED CLAIMS
received by the International Bureau on 27 July 2012 (27.07.12)

1. An energy interface system comprising:

a control module;

a plurality of slave modules electrically connected to the control module and comprising a switching device;

a plurality of circuit breakers electrically connected to the plurality of slave modules and configured to provide an electrical junction between the switching device and an electrical system; and

a control bus configured to transmit one or more control signals from the control module to at least one of the plurality of slave modules, wherein the control signals enable the switching device of at the least one of the plurality of slave modules to provide energy to the electrical system from an energy source connected to at least one of the plurality of circuit breakers.

2. The energy interface system of claim 1 wherein the control module further comprises:

a processing device; and

a computer readable medium configured to store executable instructions, that when executed by the processing device, cause the control module to transmit the one or more control signals to enable switching the device.

3. The energy interface system of claim 1 wherein the control module further comprises:

a power supply configured to provide power to the control module from the energy source connected to at least one of the plurality of circuit breakers.

4. The energy interface system of claim 1 wherein the control module further comprises:

an external communication unit configured to receive instructions from a remote computing device in communication with the external communication unit, wherein the instructions cause the control module to transmit the one or more control signals.

5. The energy interface system of claim 4 wherein the external communication unit comprises:

a network communication port for connecting to the Internet.

6. The energy interface system of claim 4 wherein the external communication unit comprises:

an antenna; and

a wireless communication port, wherein the antenna and wireless communication port are configured to wirelessly receive the instructions.

7. The energy interface system of claim 1 wherein at least one of the plurality of slave modules further comprises:

a first voltage sensor configured to measure a voltage at the connected circuit breaker and wherein the at least one of the plurality of slave modules is configured to transmit the voltage measurement at the first voltage sensor to the control module.

8. The energy interface system of claim 7 wherein the at least one of the plurality of slave modules further comprises:

a second voltage sensor configured to measure a voltage at a line side of the at least one slave module and wherein the at least one of the plurality of slave modules is configured to transmit the voltage measurement at the second voltage sensor to the control module.

9. The energy interface system of claim 1 wherein the at least one of the plurality of slave modules further comprises:

a metering circuit configured to measure a voltage and current of the at least one of the plurality of slave modules and provide electrical power metering capabilities based on the measured voltage and current of the at least one of the plurality of slave modules.

10. The energy interface system of claim 1 wherein at least one alternative energy source is electrically connected to at least one of the plurality of circuit breakers.

11. The energy interface system of claim 1 wherein the energy source comprises a utility energy source.

12. The energy interface system of claim 10 wherein the energy source comprises the at least one alternative energy source.

13. A method for controlling energy to at least one electrical component, the method comprising:

transmitting a first control signal from a control module to a first slave module on a communication bus, the first slave module comprising a first switching device disposed between a first energy source and a power bus and wherein the first control signal opens the first switching device causing the energy from the first energy source to un-energize the power bus; and

transmitting a second control signal from the control module to a second slave module on the communication bus, the second slave module comprising a second switching device disposed between a second energy source and the power bus and wherein the second control signal closes the second switching device causing the energy from the second energy source to energize the power bus;

wherein the first energy source is a utility energy source and the second energy source is an alternative energy source.

14. The method for controlling energy to at least one electrical component of claim 13 further comprising:

receiving at least one instruction from a remote computing device on an external communication unit and, in response to receiving the at least one instruction, transmitting the first control signal and the second control signal.

15. The method for controlling energy to at least one electrical component of claim 13 further comprising:

receiving a voltage measurement of the power bus from a first voltage sensor associated with the second slave module; and

receiving a voltage measurement of the second energy source from a second voltage sensor associated with the second slave module.

16. The method for controlling energy to at least one electrical component of claim 15 further comprising:

transmitting a third control signal from the control module to the second slave module on the communication bus, wherein the third control signal opens the second switching device.

17. The method for controlling energy to at least one electrical component of claim 14 further comprising:

transmitting at least one received measurement associated with the first slave module to a remote computing device utilizing an external communication unit.

18. The method for controlling energy to at least one electrical component of claim 14 further comprising:

storing a user profile in a computer-readable medium and wherein transmitting the first control signal and transmitting the second control signal is based at least on the stored user profile.

19. The method for controlling energy to at least one electrical component of claim 13 further comprising:

maintaining a date and time and wherein transmitting the first control signal and transmitting the second control signal is based at least on a time of day.

20. The method for controlling energy to at least one electrical component of claim 13 wherein transmitting the first control signal and transmitting the second control signal is based at least on information associated with the utility energy source.

21. An energy interface system comprising:

a control module;

a plurality of slave modules electrically connected to the control module and comprising a switching device, wherein at least one of the slave modules is electrically connected between a transformer device and a residential electrical system; and

a control bus configured to transmit one or more control signals from the control module to the at least one of the plurality of slave modules, wherein the control signals enable the switching device of the at least one of the plurality of slave modules to provide energy to the residential electrical system from the transformer device.

22. The energy interface system of claim 21 wherein the control module further comprises:

a processing device; and

a computer readable medium configured to store executable instructions, that when executed by the processing device, cause the control module to transmit the one or more control signals to enable switching the device.

23. The energy interface system of claim 21 wherein the control module further comprises:

an external communication unit configured to receive instructions from a remote computing device in communication with the external communication unit, wherein the instructions cause the control module to transmit the one or more control signals.

24. The energy interface system of claim 21 wherein the at least one of the plurality of slave modules further comprises:

a first voltage sensor configured to measure a voltage at the transformer device and wherein the at least one of the plurality of slave modules is configured to transmit the voltage measurement at the first voltage sensor to the control module.

25. The energy interface system of claim 21 further comprising:

a second voltage sensor configured to measure a voltage at a line side of at least one of the plurality of slave modules and to transmit the voltage measurement at the voltage sensor to the control module.

26. The energy interface system of claim 21 wherein the at least one of the plurality of slave modules further comprises:

a metering circuit configured to measure a voltage and current of the at least one of the plurality of slave modules and provide electrical power metering capabilities based on the measured voltage and current of the at least one of the plurality of slave modules.

27. The energy interface system of claim 21 further comprising:

at least one circuit breaker electrically connected to the at least one of the plurality of slave modules and configured to provide an electrical junction between the switching device and the residential electrical system.

28. The energy interface system of claim 21 wherein the switching device of the at least one of the plurality of slave modules is configured to disconnect the transformer from the residential electrical system in response to at least one command from the control module.