An appliance includes a display unit for an appliance and a control unit coupled to the display unit. The control unit is configured to detect at least one operating parameter associated with use of the appliance, calculate energy usage and energy costs associated with the at least one operating parameter, and present current energy usage and cost information on the display unit.

**Diagram:**

1. Collect operational data
2. Determine power cost
3. Calculate current energy consumption
4. Present energy consumption data
COLLECT OPERATIONAL DATA

DETERMINE POWER COST

CALCULATE CURRENT ENERGY CONSUMPTION

PRESENT ENERGY CONSUMPTION DATA

FIG. 3
FIG. 4
Position your refrigerator away from a heat source such as an oven, or direct sunlight from a window. To allow air to circulate around the condenser coils, leave a space between the wall or cabinets and the refrigerator or freezer and keep the coil clean. Make sure the door seals are airtight.
APPLICATION WITH REAL TIME ENERGY COST DISPLAYED BASED ON USAGE

CROSS-REFERENCE TO RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

[0002] The exemplary embodiments of the present invention generally relate to power usage in appliances. More particularly, the exemplary embodiments relate to providing real-time feedback on the cost of using a refrigerator.

[0003] Users typically do not have any straightforward way of determining energy consumption of an appliance, such as for example, a refrigerator. Energy consumption ties directly to the costs of operating the appliance. It is an aim of many users to minimize energy costs as much as possible.

[0004] Many refrigerators have special features and modes, including energy saving or conservation modes. The energy saving modes can be enabled to cut costs related to running the refrigerator. However, the user usually has no way to determine how much energy is being consumed during normal operation, or when using any one of the special features. It would be advantageous to know how much energy, and correspondingly how much money is being spent, or could be saved, during operation of the refrigerator. Certain behavior patterns with respect to the operation of a refrigerator can also affect the costs associated with operating the refrigerator. The behaviors, such as for example, temperature settings, the number of times the doors are opened, water dispensing and ice making cycles, can all affect energy consumption. It would be advantageous to be able to know how current behavior patterns affects the costs of operating the refrigerator.

[0005] Additionally, in many areas, different rates apply to power usage at different times of the day. For example, in some cities, electricity prices are reduced during certain times of the day to encourage non-peak use. Users are encouraged to run certain appliances during these non-peak time periods. However, it may not always be evident when the periods are or what the associated costs/savings may be. It would be advantageous to be able to easily identify power rates and other factors that impact the power rates.

[0006] Many of the environmental benefits of new appliances, such as refrigerators, can be difficult for the consumer to understand. Presently, potential energy usage and cost information is presented via a yellow Department of Energy (“DOE”) tag that affixed to the appliance. However, during actual use, these energy savings may not be realized, and there is no way for the consumer to determine if the appliance is being used as efficiently as possible and what the actual cost of operating the appliance is. Thus, it would be advantageous to be able to easily determine and identify energy consumption costs as well as energy saving potential related to usage behavior patterns of an appliance, such as a refrigerator.

BRIEF DESCRIPTION OF THE INVENTION

[0007] As described herein, the exemplary embodiments overcome one or more of the above or other disadvantages known in the art.

[0008] One aspect of the exemplary embodiments relates to an appliance. The appliance includes a display unit for an appliance and a control unit coupled to the display unit. The control unit is configured to detect at least one current operating parameter associated with use of the appliance, calculate energy usage and energy costs associated with the at least one current operating parameter, and present current energy usage and cost information on the display unit.

[0009] Another aspect of the exemplary embodiments relates to a control system for an appliance. The control system includes an information receiving unit configured to receive operational data related to use of the appliance, a computing device configured to calculate a current energy usage based on the operational data, and a display for presented the calculated current energy usage.

[0010] A further aspect of the exemplary embodiments relates to a method for calculating current energy consumption and costs. The method includes collecting operational usage data from an appliance. An energy cost rate for operation of the appliance is determined. The current cost to operate the appliance is calculated based on the operational usage data and the energy cost rate, and presented to the user.

[0011] These and other aspects and advantages of the exemplary embodiments will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed solely for purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims. Moreover, the drawings are not necessarily drawn to scale and, unless otherwise indicated, they are merely intended to conceptually illustrate the structures and procedures described herein. In addition, any suitable size, shape or type of elements or materials could be used.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] In the drawings:

[0013] FIG. 1 is a schematic illustration of an exemplary appliance incorporating features of an exemplary embodiment;

[0014] FIG. 2 is a block diagram of an exemplary control system of the appliance in FIG. 1 in accordance with an exemplary embodiment;

[0015] FIG. 3 is an exemplary process flow in accordance with an exemplary embodiment;

[0016] FIGS. 4-6 are illustrations of exemplary displays that can be used in conjunction with the aspects of the disclosed embodiments; and

[0017] FIG. 7 is one example of a control system that can be used to practice aspects of the disclosed embodiments.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS OF THE INVENTION

[0018] FIG. 1 illustrates an exemplary appliance 100 in accordance with an exemplary embodiment. In this example the appliance 100 shown is a refrigerator, but in alternate embodiments the aspects of the present invention can be applied to any appliance, including for example, but not limited to, a freezer, a range, a dishwasher, a washing machine, dryer or air-conditioner. It is a feature of the disclosed embodiments to present a user with real-time energy consumption information related to the use of the appliance with-
out the need for external power monitors. Thus, the aspects of the disclosed embodiments can be applied to any appliance that consumes energy, such as electricity, and includes a display for presenting information to the user.

[0019] The aspects of the disclosed embodiments relate to a system that is configured to provide real-time feedback on the cost of using a refrigerator. In addition to the cost of the electricity to power the refrigerator, the amount of electricity used by the refrigerator can be affected by any one of a number of factors. These factors can include, for example, the compartment temperature settings, the ambient room temperature, a number of door openings and compressor run time. A more comprehensive list is set forth in Table 1 herein. Generally, a refrigerator will also include one or more energy saving operating modes that can be utilized. The real-time display system of the disclosed embodiments will provide the user with information related to the real-time cost of operating the refrigerator. Information related to energy saving features of the refrigerator that can be used in the current operating environment can be presented as well. This information can help the user operate the refrigerator in the most efficient manner, based on the actual operating environment and current energy costs, as well as historical operating data or prospective operation.

[0020] As shown in FIG. 1, the exemplary refrigerator 100 includes at least a refrigeration compartment 102 having a door 104 and a freezer compartment 106 with door 108. A display unit 110 is provided on an exterior of door 108. In the embodiment shown in the figure, the display unit 110 is placed above the dispenser 114 that is provided at a side of the front surface of the door 108. In alternate embodiments, the display unit 110 can be provided on any suitable location on the refrigerator 100 that is easily accessible by the user. The refrigerator 100 will be coupled to a power source 112. The refrigerator can include other suitable components associated with a refrigerator, such as for example, a water/ice dispenser 114.

[0021] The display unit 110 is generally configured to display user interfaces and screen information related to the operation and functions of refrigerator 100. Each of these operations and functions will not be described herein and the scope of the disclosed embodiments is not intended to be limited by any such operation and/or function. The display unit 110 allows a user to view information related to the refrigerator operation as well as control the various operational modes and functions of the refrigerator 100.

[0022] As shown in FIG. 1, the display unit 110 includes at least one input area 120 and an information display area 130. The input area 120 allows the user to select and/or activate different functions of the refrigerator 100, as well as input data or other information. The scope of the disclosed embodiments is not limited by the arrangement of the input area 120 and information display area 130 shown in FIG. 1. With the advances in touch sensitive and active displays, the input area 120 and information display area 130 can comprise any suitable configuration. It is a feature of the disclosed embodiments to be able to input data and receive information through the display unit 110.

[0023] The information displayed on the information area 130 can include for example, but is not limited to, the set temperatures of the freezing chamber and the refrigerating chamber, service modes of the dispenser 114, operating modes of the refrigerator, date and time information, and room temperature information. In alternate embodiments, any suitable information can be presented on the display 110. In the exemplary embodiment shown in FIG. 1, the input area 120 includes buttons 122, 124 and 126 that can be used to select and/or activate the functions of the refrigerator 100. In alternate embodiments, the input area 120 can include any suitable function or information activation buttons. The temperature setting button 122 can be used for setting the temperatures of the freezing chamber 106 and the refrigerating chamber 102. The dispenser mode setting button 124 is used for setting a service mode (cubed ice, water or crushed ice) of the dispenser 114. The menu setting button 126 is used for selecting and/or activating features related to the user interface displayed on the display unit 110. Other buttons (not shown) can be included for selecting and/or activating other functions such as, for example, but not limited to, a refrigerator chamber illuminating lamp activation setting, an input unit lock/unlock setting and an express freezing setting.

[0024] In accordance with the aspects of the disclosed embodiments, the display unit 110 for the refrigerator 100 is configured to provide active, real-time feedback to the user on the cost of operating the refrigerator 100. The costs associated with using the refrigerator 100 are based on the current operating and usage patterns and energy consumptions costs, such as the cost per kilowatt hour charged by the corresponding electrical utility. In one embodiment, the refrigerator 100 includes a control unit, such as the control unit 200 shown in FIG. 2, that is configured to gather information and data related to current usage patterns as well as the current power costs. This information is used to determine current costs associated with using the refrigerator and can be presented to the user via the display 110. In one embodiment, the control unit 200 includes, or is able to access, look-up tables or formulas that allow the control unit to determine the current costs.

[0025] In one embodiment, the control unit 200 can also be configured to present information regarding energy saving features that can be utilized. The control unit 200 can also be configured to determine potential energy or cost savings based on a pre-determined set of operating parameters and present energy saving advice or recommendations.

[0026] FIG. 2 is a block diagram illustrating an exemplary configuration of a control unit 200 for the refrigerator 100 of FIG. 1 incorporating aspects of the disclosed embodiments. As shown in FIG. 2, the control unit 200 comprises a display unit 210 for displaying information and screens, an information receiving unit 204 for receiving information related to the operation of the refrigerator 100, a storage unit 206 for storing information related to operation of the refrigerator 100, such as usage and cost data, an input unit 208 for receiving information related to energy costs and other usage parameters, and a microcomputer 202 for controlling the display unit 210, the information receiving unit 204, the storage unit 206 and the input unit 208, processing the inputs and producing the desired real-time feedback. In alternate embodiments, the control unit 200 can include other suitable components for providing active, real-time feedback to a user on the cost of operating a refrigerator based on current usage patterns and energy cost.

[0027] The information receiving unit 204 is configured to detect and collect usage patterns related to the operation of the refrigerator 100 shown in FIG. 1. Examples of data that can be captured by the information receiving unit 204 for calculating and displaying the energy costs, can include, but are not limited to those set forth in Table 1, below.
TABLE 1

EXEMPLARY PARAMETERS

- Set temperature of the refrigeration or refrigerator compartment;
- Set temperature of the freezer compartment;
- Ambient room temperature;
- The number of refrigerator compartment door openings during a set period;
- The number of freezer compartment door openings during a set period;
- A number of ice dispensers;
- A number of water dispensers;
- Compressor run time;
- A number of lights in the refrigerator;
- Operational modes of the refrigerator, including for example, the number of features on, such as select temperature, pur, quick chill, quick freeze, or quick thaw.

[0028] In alternate embodiments, the information receiving unit 204 can receive and collect any suitable behavior information that is related to, or affects, the costs of operating the particular appliance. For example, if the appliance is a dishwasher, the data could include the length of the wash cycle, the temperature of the water, the drying temperature and time and the amount of water used. This data is then used to provide the user with real-time feedback on the operational costs, as well as, in some cases, energy saving recommendations. In one embodiment, the information receiving unit 204 includes sensors and/or detectors (not shown) that are used to detect the usage data and transmit the usage data to the information receiving unit 204.

[0029] In one embodiment, the user can configure the information receiving unit 204 to detect and/or process any one or more of the parameters identified above in calculating the real-time operating costs. For example, the user may wish to only consider certain parameters and exclude others for purposes of calculating the operational cost. The information receiving unit 204 can be programmed in this regard. Certain parameters can also be manually entered into the control unit 200 via, for example, the input unit 208, which in one embodiment may also be part of the display unit 210, as illustrated in the example of FIG. 1. This can also allow the user to forecast expected operational costs under specific operational parameters. For example, if the user desires to obtain potential energy expense data under certain operational conditions, such as pre-determined temperature or run cycles, the conditions can be specified by the user and transmitted to the information receiving unit 204. The cost associated with the pre-specified particulars can then be determined and presented. This allows the user to predict what the operating costs for the refrigerator will be under pre-determined operating conditions.

[0030] The information receiving unit 204 is also configured to detect or receive data related to the power costs, such as the cost per kilowatt hour of power. The data can be sensed from a signal transmitted by the power company and received through a power line of the refrigerator or manually entered by the user via the input unit 208.

[0031] The storage unit 206 is configured to store the information and data collected by the information receiving unit 204. In one embodiment, the storage unit comprises any suitable data storage device for storing data and information. Examples include, but are not limited to, Read-Only-Memory (“ROM”), Random Access Memory (“RAM”), magnetic media, or any other suitable computer readable medium. This will allow the user to utilize current operational data, as well as historical operational data, to determine and compare operating costs.

[0032] The input unit 208 is configured to allow a user to manually enter data into the system 200. For example, as noted above, different operating parameters can be manually set. Also, cost data can be manually entered. The input unit 208, which can also be integral to the display unit 210, provides for the entry of data and information, as well as the selection and activation of different functions. The information and data received by the input unit 208 can be stored in the storage unit 206.

[0033] The microcomputer 202 is configured to receive the operational data and power cost information from the information receiving unit 204 and/or the input unit 208. The information and data can be received directly from the information receiving unit 204 or input unit 208, or accessed from the storage unit 206. The microcomputer 202 will process the information and calculate the real-time cost of the operating the refrigerator. This data will then be provided to the display unit 210 for presentation to the user. In one embodiment, the microcomputer 202 can comprise the same computing device that controls the general operations of the refrigerator, or be separately provided. If the microcomputer 202 is separately provided, in one embodiment, it is connected to the main computing device through a communication line for data communications and data detection and input.

[0034] The display unit 210 is configured to provide information and data to the user, as well as receive inputs and commands. The display unit 210 can include a device that includes a touch screen display, proximity screen device or other graphical user interface. A pointing device, such as for example, the user’s finger, may be used with the display unit 210. The display unit can comprise any suitable display, such as for example, a flat display that is made of a liquid crystal display (LCD) with optional back lighting, such as a thin film transistor (TFT) matrix capable of displaying color images.

[0035] The terms “select” and “touch” are generally described herein with respect to a touch screen display. However, in alternate embodiments, the terms are intended to encompass the required user action with respect to other input devices. For example, with respect to a proximity screen device, it is not necessary for the user to make direct contact in order to select an object or other information. Thus, the above noted terms are intended to include that a user only needs to be within the proximity of the device to carry out the desired function.

[0036] Similarly, the scope of the intended devices is not limited to single touch or contact devices. Multi-touch devices, where contact by one or more fingers or other pointing devices can navigate on and about the screen, are also intended to be encompassed by the disclosed embodiments. Non-touch devices are also intended to be encompassed by the disclosed embodiments. Non-touch devices include, but are not limited to, devices without touch or proximity screens, where navigation on the display and menus of the various applications is performed through, for example, buttons 120 of the system.

[0037] FIG. 3 illustrates an exemplary process flow incorporating aspects of the disclosed embodiments. In one embodiment, the usage data related to the operation of the refrigerator is collected 302. Examples of the types of usage
data are listed in Table 1. In one embodiment, manually entered data or historical usage data can also be used.

[0038] The current power cost is determined 304. The cost can be determined by information transmitted, such as in conjunction with the power delivery, or manually entered by the user.

[0039] Using the usage data and power cost information, the energy consumption cost is determined 306 and presented 308 to the user. In one embodiment, the presentation of energy consumption data could also include information about energy saving features that can be utilized, particularly with respect to the operational patterns recognized with respect to the refrigerator.

[0040] Additionally, collecting the operational data 302 can include receiving pre-determined operational parameters. For example, the user may wish to know the cost, or cost savings, if the refrigerator is kept at a certain temperature or if certain lights were disabled. In this embodiment, collecting the operational data 302 includes allowing the user to pre-select or specify certain operating conditions or parameters. The energy costs under these specified conditions can then be determined and presented to the user, together with other cost saving operational considerations or recommendations.

[0041] FIGS. 4-6 illustrate different exemplary displays of information and data related to energy usage in accordance with the aspects of the disclosed embodiments. For example, referring to FIG. 4, three embodiments of a display unit 410 are illustrated. Generally, the display unit 410 includes an input area 420, where various buttons are provided for selecting and controlling functions of the refrigerator or the type of information to be presented on the display. In display 410a, the temperature of the freezer and refrigerator compartments of the refrigerator 100 is presented on screen 430a, as is indicated by indicator 402. The display 410a also includes an energy usage display area or icon 404. Indicator 406 is used to present the energy usage of the refrigerator, as determined in accordance with the disclosed embodiments. In this example, indicator 406 comprises a series of lights or LEDs. The indicator 406 will illuminate one or more of the lights along the scale from “Poor” to “Excellent”, to indicate the level of energy usage. In one embodiment, “poor” energy usage occurs when the compressor and/or the fan is running at a relatively high speed, the door is opened frequently or for a relatively long period of time, and/or there is a lot of ice making activities, and “excellent” energy usage occurs when the compressor and/or the fan is running at a relatively low speed, the door is opened infrequently or for a relatively short period of time, and/or there is little ice making activities.

[0042] In display 410b, the energy usage is presented on screen 430b “Current Watts.” The display 410b includes a button 408 that allows the user to select to display the current energy usage on screen 430b, if that is not the information that is currently being presented on screen 430b.

[0043] In display 410c, an icon 412 is presented to inform the user of the current energy usage and/or efficiency of the refrigerator 100. In this example, the icon 412 indicates that the refrigerator 100 is “Running at Optimal Efficiency.” In alternate embodiments, any suitable icon can be used to present information on the different levels of efficiency that the refrigerator 100 is operating at. Optimal efficiency can be determined, for example, by the compressor and/or the fan speed. Generally, the refrigerator is optimal efficiency when the compressor and/or the fan is at a low speed (i.e., the speed is below a predetermined threshold), less efficient at medium or high speed. In one embodiment, the control unit 200 is configured to control and knows the speed of the compressor and/or the fan.

[0044] FIG. 5 illustrates another example of a display 510 that can be utilized for presenting information and data in accordance with aspects of the disclosed embodiments. The display 510 includes input area 520 and screen 530a. Input area 520 includes a number of buttons that can be used to select and control functions of the device or the information to be displayed on screen 530a.

[0045] In screen 530b, a graph 502 is displayed that presents energy usage or consumption over time. Screen 530c presents information 504 related to energy saving tips. In one embodiment, each of the screens 530a-530c can be selected by accessing a menu structure through the settings button 506. In alternate embodiments, any suitable mechanism can be used to access and present each of the different screens 530a-530c.

[0046] Referring to FIG. 6, another example of a display 610 incorporating aspects of the disclosed embodiments is illustrated. As shown in FIG. 6, the display 610 includes screen 630a and input areas 620a and 620b. Area 602 displays the temperature settings of the compartments of the refrigerator 100. In one embodiment, each indicator in the area 602 can also be used to set a temperature of the respective compartment. The screen 630a presents an energy gauge 602 that uses light or LED indicators to indicate the energy usage. As shown in screen 630a, other suitable information related to the operation of the refrigerator can be presented as well, such as for example, the number of door openings.

[0047] In one embodiment, selection of the energy gauge indicator 602, such as for example by “tapping” on the indicator 602, will cause screen 630b to be presented on the display 610. In this example, screen 630b replaces screen 630a, indicators 602 and input area 620a. The screen 630b of display 610 presents information 604 related to the energy control level. In one embodiment, the information 604 is a selectable icon, that includes arrow indicators 606a and 606b. The indicators 606a and 606b allows the user to select and review other information related to different energy control levels.

[0048] The screen 630b also presents selection or function buttons 608a-608c. Selection of button 608a will present energy saving tips, as shown in screen 630c. Selection of the energy gauge options button 608b will cause further selection and function control options to be presented as shown in screen 630d. The energy calculator button 608c will cause the energy calculator shown in screen 630c to be presented. Each screen 630b-630c also includes a “Back” button 612, that when selected, allows the user to return to the previous screen.

[0049] The energy saving tips screen 630c allows the user to review information 614 related to energy saving techniques and concepts. In one embodiment, this information can be stored in the control unit 200 for example, or downloaded from an outside source, such as the Internet. The screen 630c presents controls 616a and 616b that allows the user to scroll the available information 614.

[0050] The energy gauge options screen 630d allows the user to select and control different categories 618 of information and function related to control of the refrigerator and the calculation of energy used. For example, the Location button 618a can allow the user to define the location of the refrigerator 100 so that energy rates can be properly applied. Reduced Lighting button 618b allows the user to select a
desired level of lighting. Limited Cooling Features button 618c allows the user to control the amount of cooling provided. Button 618d controls a Vacation Mode function, button 618e controls a Quick Controls function, and button 618f allows the user to select between Day and Night cycles. In alternate embodiments, the area 618 can provide access to any suitable controls for controlling the energy usage of the refrigerator 100.

[0051] The energy calculator 630e generally allows the user to input or program data into the calculator data area 624, with a corresponding output provided in area 626. In this example, data for the freezer compartment temperature 624a, the refrigeration compartment temperature 624b, the average door openings per week 624c, as well as the unit electricity cost can be inputted and/or adjusted. In alternate embodiments, any suitable parameters and variables related to energy cost and consumption can be presented in area 624. The costs and energy usage related to the current settings of the refrigerator 100 are presented in area 626. The changes in the current settings, which are reflected in the information inputted into area 624, are then used to calculate the potential costs. The calculated cost and energy usage data using the values from area 624 is presented in area 628.

[0052] The disclosed embodiments may also include software and computer programs incorporating the process steps and instructions described above. In one embodiment, the programs incorporating the process steps described herein can be executed in one or more computers. FIG. 7 is a block diagram of one embodiment of a typical control system 700 incorporating features that may be used to practice aspects of the invention.

[0053] As shown in FIG. 7, a computing device 702 is capable of receiving information from, and/or sending information to, a data input system 704, which can include for example sensors, monitors or other computing devices. In one embodiment, computing device 702 is adapted to communicate with a network 706 in any conventional manner including, including for example, a modem, wireless or hard wire connection, or fiber optic link. Generally, information can be made available to computing device 702 using a communication protocol typically sent over a communication channel or other suitable connection or link, communication channel or link. In one embodiment, the communication channel comprises a suitable broadband communication channel.

[0054] Computing device 702 is generally adapted to utilize program storage devices embodying include computer readable program code means, which is adapted to cause the computing device 702 to perform the method steps and processes disclosed herein. The computer readable program code is stored in a program storage device or computer readable medium, such as for example a memory. For example, computing device 702 may include a data storage device 708 for the storage of program code, information and data. In one embodiment, the computer readable program code can be stored in a memory medium that is external to, or remote from, the control system 700. The memory medium can be direct coupled or wirelessly coupled to the control system 700. The program storage devices incorporating aspects of the disclosed embodiments may be devised, made and used as a component of a machine utilizing optics, magnetic properties and/or electronics to perform the procedures and methods disclosed herein. In alternate embodiments, the program storage devices may include magnetic media, such as a diskette, disk, memory stick or computer hard drive, which is readable and executable by a computer. In other alternate embodiments, the program storage devices could include optical disks, read-only-memory (“ROM”) floppy disks and semiconductor materials and chips. The computing device 702 may also include or be coupled to one or more processors for executing stored programs.

[0055] In one embodiment, computing device 702 may include or be coupled to a user interface 710. The user interface 710 can include or be coupled to one or data or control input devices 720 and one or more information and data display devices 730. The user interface 710 can allow the input of queries and commands to the system, as well as present the results of the commands and queries, as described with reference to FIG. 1, for example. The information and data displays described herein can be presented on display 730.

[0056] The aspects of the disclosed embodiments allow a user to see the real-time feedback on the cost of using the appliance. The operational and usage factors are taken into consideration together with the current power delivery cost to provide the real-time cost feedback. The information displayed is thus based on usage or historical test data, but not a power sensor directly attached to the appliance. This information can help the user operate the appliance in the most efficient manner, based on the actual operating environment and current energy costs.

[0057] Thus, while there have been shown and described and pointed out fundamental novel features of the invention as applied to the exemplary embodiments thereof, it will be understood that various omissions and substitutions and changes in the form and details of devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit of the invention. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the invention. Moreover, it should be recognized that structures and/or elements and/or method steps shown and/or described in connection with any disclosed form or embodiment of the invention may be incorporated in any other disclosed or described or suggested form or embodiment as a general matter of design choice. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

What is claimed is:
1. An appliance comprising:
   a display unit for an appliance;
   a control unit coupled to the display unit, the control unit being configured to:
   detect at least one operating parameter associated with use of the appliance;
   calculate current energy usage of the appliance associated with the at least one operating parameter; and
   present the current energy usage on the display unit.
2. The appliance of claim 1, wherein the control unit is further configured to detect an energy cost rate by detecting a signal received through a power line of the appliance or a manual input to the control unit.
3. The appliance of claim 2, wherein the control unit is further configured to determine an energy cost corresponding to the current energy usage and the energy cost rate and present the energy cost on the display unit.
4. The appliance of claim 1, further comprising a usage sensor coupled to the control unit, the usage sensor being
configured to detect the at least one operating parameter and provide the at least one parameter to the control unit for calculating energy usage and energy cost associated with a current operating mode of the appliance.

5. The appliance of claim 4, wherein the appliance is a refrigerator and wherein the at least one parameter data detected by the usage sensor is a number of freezer door openings, a number of refrigerator door openings, freezer compartment temperature, refrigerator compartment temperature, room ambient temperature, compressor run time, a number of ice making cycles, a number of ice dispenses, a number of water dispenses, a number of operating lights in the refrigerator, quick chill settings, quick freeze settings or quick thaw settings.

6. The appliance of claim 1, further comprising an input unit, the input unit being configured to receive manually established operating parameters and wherein the control unit is further configured to calculate a potential energy usage based on the manually established operating parameters, compare the potential energy usage to the current energy usage, and present comparison data on the display unit.

7. The appliance of claim 3, further comprising an energy gauge presented on the display unit, the energy gauge being configured to present real-time information corresponding to the current energy usage and the determined energy cost.

8. The appliance of claim 1, wherein the display unit is integral to the appliance.

9. The appliance of claim 1, wherein the control unit is configured to detect the current energy usage from a power line of the appliance.

10. A control system for an appliance, comprising:

- an information receiving unit configured to receive operational data related to use of the appliance;
- a computing device configured to calculate a current energy usage based on the operational data; and
- a display for presenting the calculated current energy usage.

11. The control system of claim 10, wherein the information receiving unit is further configured to receive energy cost data related to use of the appliance and the computing device is configured to calculate a current energy cost related to use of the appliance.

12. The control system of claim 10, wherein the computing device is configured to present information related to energy saving modes to be used in conjunction with a current operating state of the appliance.

13. The control system of claim 12, further comprising an input unit configured to receive information related to predetermined operational parameters of the appliance, and wherein the computing device is further configured to calculate an energy cost associated with the predetermined operational parameters and present the calculated energy cost on the display.

14. A method comprising:

- collecting operational usage data from an appliance;
- determining an energy cost rate for operation of the appliance;
- calculating a current energy cost to operate the appliance based on the operational usage data and the energy cost rate; and
- presenting the current energy cost to a user.

15. The method of claim 14, wherein the operational usage data is a number of freezer door openings, a number of refrigerator door openings, freezer compartment temperature, refrigerator compartment temperature, room ambient temperature, compressor run time, a number of ice making cycles, a number of ice dispenses, a number of water dispenses, a number of operating lights in the refrigerator, quick chill settings, quick freeze settings or quick thaw settings.

16. The method of claim 15, wherein the appliance is a refrigerator.

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