



UNITED STATES
PATENT AND TRADEMARK OFFICE

15/616,719 | EFACT.012C3:

SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM

Application #	Attorney Docket #	Patent #	Status	Filing or 371 (c) date
15/616,719	EFACT.012C3		Abandoned -- Failure to Respond to an Office Action - 02/28/2019	06/07/2017

Documents & transaction history

Documents				
Mail room date	Doc code	Doc description	Pages	Quick download
06/07/2017	ADS	Application Data Sheet	8	
06/07/2017	SPEC	Specification	52	
06/07/2017	CLM	Claims	1	
06/07/2017	ABST	Abstract	1	
06/07/2017	DRW	Drawings-only black and white line drawings	47	
06/07/2017	OATH	Oath or Declaration filed	1	
06/07/2017	N417	Electronic Filing System(EFS) Acknowledgment Receipt	2	
06/16/2017	NTC.MISS.PRT	Notice to File Missing Parts	2	
06/16/2017	WFEE	Fee Worksheet (SB06)	1	
06/16/2017	APP.FILE.REC	Filing Receipt	3	
08/14/2017	A.PE	Preliminary Amendment	1	
08/14/2017	CLM	Claims	3	
08/14/2017	REM	Applicant Arguments/Remarks Made in an Amendment	6	
08/14/2017	PA..	Power of Attorney	2	

Mail room date	Doc code	Doc description	Pages	Quick download
08/14/2017	LET.	Miscellaneous Incoming Letter	2	
08/14/2017	TRAN.LET	Transmittal Letter	2	
08/14/2017	IDS	Information Disclosure Statement (IDS) Form (SB08)	12	
08/14/2017	NPL	Non Patent Literature	15	
08/14/2017	WFEE	Fee Worksheet (SB06)	2	
08/14/2017	N417	Electronic Filing System(EFS) Acknowledgment Receipt	3	
08/14/2017	PEFR	Applicant Response to Pre-Exam Formalities Notice	1	
08/17/2017	APP.FILE.REC	Filing Receipt	3	
08/17/2017	WFEE	Fee Worksheet (SB06)	1	
08/17/2017	N570	Communication - Re: Power of Attorney (PTOL-308)	1	
11/24/2017	NTC.PUB	Notice of Publication	1	
08/01/2018	CTNF	Non-Final Rejection	6	
08/01/2018	892	List of references cited by examiner	1	
08/01/2018	BIB	Bibliographic Data Sheet	1	
08/01/2018	SRFW	Search information including classification, databases and other search related notes	1	
08/01/2018	FWCLM	Index of Claims	1	
08/01/2018	SRNT	Examiner's search strategy and results	4	
08/01/2018	1449	List of References cited by applicant and considered by examiner	12	
01/31/2019	XT/	Extension of Time	2	
01/31/2019	WFEE	Fee Worksheet (SB06)	2	
01/31/2019	N417	Electronic Filing System(EFS) Acknowledgment Receipt	2	
03/05/2019	ABN	Abandonment	2	

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.012C3
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Inventor Information:

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	John	Douglas	Steinberg			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						
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Postal Code	94030	Country i	US			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.						
Add						

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
☐ An Address is being provided for the correspondence Information of this application.	
Customer Number	20995
Email Address	efiling@knobbe.com
Add Email Remove Email	

Application Information:

Title of the Invention	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM		
Attorney Docket Number	EFACT.012C3	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	47	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.012C3
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Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number ☐ US Patent Practitioner ☐ Limited Recognition (37 CFR 11.9)
Customer Number	20995

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	14/491554	2014-09-19

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number		EFACT.012C3	
		Application Number			
Title of Invention	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM				

Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14/491554	Continuation of	14/048932	2013-10-08	8840033	2014-09-23

Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14/048932	Continuation of	12/788246	2010-05-26	8556188	2013-10-15

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)

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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.012C3
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Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

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☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.012C3
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	1 Remove		
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section. Clear			
☒ Assignee		☐ Legal Representative under 35 U.S.C. 117	
☐ Joint Inventor			
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor:			
If the Applicant is an Organization check here. ☒			
Organization Name	EcoFactor, Inc.		
Mailing Address Information For Applicant:			
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City	Redwood City	State/Province	CA
Country	US	Postal Code	94063
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. Add			

Assignee Information including Non-Applicant Assignee Information:

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		Application Number	
Title of Invention	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM		

Assignee	1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
				Remove
If the Assignee or Non-Applicant Assignee is an Organization check here.				☐
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
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Address 2				
City		State/Province		
Country ⁱ		Postal Code		
Phone Number		Fax Number		
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Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is **not** checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/John R. King/		Date (YYYY-MM-DD)	2017-06-07
First Name	John	Last Name	King	Registration Number
				34362
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	EFACT.012C3
		Application Number	
Title of Invention	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
- 3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

**SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO
OPTIMIZE AN ENERGY MANAGEMENT SYSTEM**

Cross-Reference to Related Applications

[0001] Any and all applications for which a foreign or domestic priority claim is identified in the Application Data Sheet, or any correction thereto, are hereby incorporated by reference under 37 CFR 1.57.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] This invention relates to the use of thermostatic HVAC and other energy management controls that are connected to a computer network. More specifically, the present invention pertains to the use of geographic movement of network-connected mobile devices to occupancy to inform an energy management system, to provide enhanced efficiency, and to verify demand response.

Description of the Related Art

[0003] Heating and cooling systems for buildings (heating, ventilation and cooling, or HVAC systems) have been controlled for decades by thermostats. At the most basic level, a thermostat includes a means to allow a user to set a desired temperature, a means to sense actual temperature, and a means to signal the heating and/or cooling devices to turn on or off in order to try to change the actual temperature to equal the desired temperature. The most basic versions of thermostats use components such as a coiled bi-metallic spring to measure actual temperature and a mercury switch that opens or completes a circuit when the spring coils or uncoils with temperature changes. More recently, electronic digital thermostats have become prevalent. These thermostats use solid-state devices such as thermistors or thermal diodes to measure temperature, and microprocessor-based circuitry to control the switch and to store and operate based upon user-determined protocols for temperature vs. time.

[0004] These programmable thermostats generally offer a very restrictive user interface, limited by the cost of the devices, the limited real estate of the small wall-mounted boxes, and the inability to take into account more than two variables: the desired temperature set by the user, and the ambient temperature sensed by the thermostat. Users can generally only set one series of commands per day, and in order to change one parameter (e.g., to change the late-night temperature) the user often has to cycle through several other parameters by repeatedly pressing one or two buttons.

[0005] Because the interface of programmable thermostats is so poor, the significant theoretical savings that are possible with them (sometimes cited as 25% of heating and cooling costs) are rarely realized. In practice, studies have found that more than 50% of users never program their thermostats at all. Significant percentages of the thermostats that are programmed are programmed sub-optimally, in part because, once programmed, people tend to not to re-invest the time needed to change the settings very often.

[0006] A second problem with standard programmable thermostats is that they represent only a small evolutionary step beyond the first, purely mechanical thermostats. Like the first thermostats, they only have two input signals - ambient temperature and the preset desired temperature. The entire advance with programmable thermostats is that they can shift between multiple present temperatures at different times without real-time involvement of a human being.

[0007] Because most thermostats control HVAC systems that do not offer infinitely variable output, traditional thermostats are designed to permit the temperature as seen by the thermostat to vary above and below the setpoint to prevent the HVAC system from constantly and rapidly cycling on and off, which is inefficient and harmful to the HVAC system. The temperature range in which the thermostat allows the controlled environment to drift is known as both the dead zone and, more formally, the hysteresis zone. The hysteresis zone is frequently set at +/- 1 degree Fahrenheit. Thus if the setpoint is 68 degrees, in the heating context the thermostat will allow the inside temperature to fall to 67 degrees before turning the heating system on, and will allow it to rise to 69 degrees before turning it off again.

[0008] As energy prices rise, more attention is being paid to ways of reducing energy consumption. Because energy consumption is directly proportional to setpoint - that is, the further a given setpoint diverges from the balance point (the inside temperature assuming no HVAC activity) in a given house under given conditions, the higher energy consumption will be to maintain temperature at that setpoint), energy will be saved by virtually any strategy that over a given time frame lowers the average heating setpoint or raises the average cooling setpoint. Conventional programmable thermostats allow homeowners to save money and energy by pre-programming setpoint changes based upon comfort or schedule. For example, in the summer, allowing the setpoint to rise by several degrees (or even shutting off the air conditioner) when the home is unoccupied will generally save significantly on energy. But such thermostats have proven to be only minimally effective in practice. Because they have such primitive user interfaces, they are difficult to program, and so many users never bother at all, or set them up once and do not alter the programming even if their schedules change.

[0009] In the hotel industry, the heating and cooling decisions made in hundred or even thousands of individual rooms with independently controlled HVAC systems are aggregated into a single energy bill, so hotel owners and managers are sensitive to energy consumption by those systems. Hotel guests often turn the air conditioner to a low temperature setting and then leave the room for hours at a time, thereby wasting considerable energy. An approach commonly used outside of the United States to combat this problem is to use a keycard to control the HVAC system, such that guests place the keycard into a slot mounted on the wall near the door of the room which then triggers the lights and HVAC system to power up, and turn them off when the guest removes the card upon leaving the room. However, because most hotels give each guest two cards, it is easy to simply leave the extra card in the slot, thus defeating the purpose of the system. Recently, systems have been introduced in which a motion sensor is connected to the control circuitry for the HVAC system. If no motion is detected in the room for some predetermined interval, the system concludes that the room is unoccupied, and turns off the HVAC system or alters the setpoint to a more economical level. When the motion sensor detects motion (which is assumed to

coincide with the return of the guest), the HVAC system resets to the guest's chosen setting.

[0010] Adding occupancy detection capability to residential HVAC systems could also add considerable value in the form of energy savings without significant tradeoff in terms of comfort. But the systems used in hotels do not easily transfer to the single-family residential context. Hotel rooms tend to be small enough that a single motion sensor is sufficient to determine with a high degree of accuracy whether or not the room is occupied. A single motion sensor in the average home today would have limited value because there are likely to be many places one or more people could be home and active yet invisible to the motion sensor. The most economical way to include a motion sensor in a traditional programmable thermostat would be to build it into the thermostat itself. But thermostats are generally located in hallways, and thus are unlikely to be exposed to the areas where people tend to spend their time. Wiring a home with multiple motion sensors in order to maximize the chances of detecting occupants would involve considerable expense, both for the sensors themselves and for the considerable cost of installation, especially in the retrofit market. Yet if control is ceded to a single-sensor system that cannot reliably detect presence, the resulting errors would likely lead the homeowner to reject the system.

[0011] Although progress in residential HVAC control has been slow, tremendous technological change has come to the tools used for personal communication. When programmable thermostats were first offered, telephones were virtually all tethered by wires to a wall jack. But now a large percentage of the population carries at least one mobile device capable of sending and receiving voice or data or even video (or a combination thereof) from almost anywhere by means of a wireless network. These devices create the possibility that a consumer can, with an appropriate mobile device and a network-enabled HVAC system, control his or her HVAC system even when away from home. But systems that relay on active management decisions by consumers are likely to yield sub-optimal energy management outcomes, because consumers are unlikely to devote the attention and effort required to fully optimize energy use on a daily basis.

[0012] Many new mobile devices now incorporate another significant new technology – the ability to geolocate the device (and thus, presumably, the user of the device). One method of locating such devices uses the Global Positioning System (GPS). The GPS system uses a constellation of orbiting satellites with very precise clocks to triangulate the position of a device anywhere on earth based upon arrival times of signals received from those satellites by the device. Another approach to geolocation triangulates using signals from multiple cell phone towers. Such systems can enable a variety of so-called “location based services” to users of enabled devices. These services are generally thought of as aids to commerce like pointing users to restaurants or gas stations, etc.

[0013] It would be desirable to provide a system that could detect the location of regular occupants of a home or other structure without requiring the installation of additional hardware; that could accurately use such geospatial information in order to detect and predict occupancy, and could optimize energy consumption based upon dynamic and individually configurable heuristics.

SUMMARY OF THE INVENTION

[0014] In one embodiment, the invention comprises a thermostat attached to an HVAC system, a local network connecting the thermostat to a larger network such as the Internet, and one or more geolocation-enabled mobile devices attached to the network, and a server in bi-directional communication with a plurality of such thermostats and devices. The server pairs each thermostat with one or more geolocation-enabled mobile devices which are determined to be associated with the occupants of home in which the thermostat is located.

[0015] The server logs the ambient temperature sensed by each thermostat vs. time and the signals sent by the thermostats to their HVAC systems. The server also monitors and logs the geolocation data related to the geolocation-enabled mobile devices associated with each thermostat. Based on the locations and movement evidenced by geolocation data, the server instructs the thermostat to change temperature settings between those optimized for occupied and unoccupied states at the appropriate times based on the evolving geolocation data.

[0016] One embodiment of the invention is directed to a method for varying temperature setpoints for an HVAC system. The method comprises determining the geographic location of a mobile electronic device that is connected to a network and associating said mobile electronic device to a structure having a known geographic location that contains one or more networked climate control devices. In addition, the method comprises determining whether the location of said mobile electronic device indicates occupancy of said structure by a person associated with said mobile electronic device and adjusting the temperature setpoint on said controller for an HVAC system for said structure based upon whether or not said structure is deemed to be occupied.

[0017] In another embodiment, the mobile electronic device is a telephone. In an additional embodiment, the networked mobile electronic device is a personal digital assistant. In a further embodiment, the mobile electronic device is connected to the Internet.

[0018] In one embodiment the method for determining the geographic location of a mobile electronic device uses the global positioning system. In another embodiment, the method for determining the geographic location of a mobile electronic device is based upon estimation of the distance between the mobile electronic device and one or more antennas used to receive radio signals from said mobile electronic device. In a further embodiment, the mobile electronic device communicates with a remote server.

[0019] In yet another embodiment, the variation of temperature setpoints is logged to a database. In a further embodiment, the variation of temperature setpoints is initiated by a remote computer. In a different embodiment, the temperature setpoints are varied automatically. In a further embodiment, an occupant is prompted to confirm occupancy prior to adjustment of said temperature setpoint.

[0020] In one embodiment, a system for altering the setpoint on a thermostat for space conditioning of a structure comprises at least one said thermostat having at least one temperature setting associated with the presence of one or more occupants in said structure, and at least one temperature setting associated with the absence of occupants in said structure. The system also comprises one or more mobile electronic

devices having at least a user interface, where the mobile electronic devices and said thermostat are connected to a network and where the setpoint on said thermostat is adjusted between said temperature setting associated with the presence of one or more occupants in said structure and said temperature setting associated with the absence of occupants in said structure based upon the geographic location of said electronic device.

[0021] In a further embodiment, the mobile electronic device is a telephone. In yet another embodiment, the networked mobile electronic device is a personal digital assistant. In still a further embodiment, the mobile electronic device is connected to the Internet.

[0022] In one embodiment, the method for determining the geographic location of a mobile electronic device is the global positioning system. In another embodiment, the method for determining the geographic location of a mobile electronic device is based upon estimation of the distance between the mobile electronic device and one or more antennas used to receive radio signals from said mobile electronic device. In a further embodiment, the mobile electronic device communicates with a remote server.

[0023] In a different embodiment, the variation of temperature setpoints is logged to a database. In another embodiment, the variation of temperature setpoints is initiated by a remote computer. In a further embodiment, the temperature setpoints are varied automatically. In still another embodiment, an occupant is prompted to confirm occupancy prior to adjustment of said temperature setpoint.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] Figure 1 shows an example of an overall environment in which an embodiment of the invention may be used.

[0025] Figure 2 shows a high-level illustration of the architecture of a network showing the relationship between the major elements of one embodiment of the subject invention.

[0026] Figures 3a and 3b show an embodiment of the website to be used as part of the subject invention.

[0027] Figure 4 shows a high-level schematic of the thermostat used as part of an embodiment of the subject invention.

[0028] Figure 5 shows one embodiment of the database structure used as part of an embodiment of the subject invention.

[0029] Figures 6a and 6b illustrate pages of a website that may be used with an embodiment of the subject invention.

[0030] Figure 7 is a flowchart showing the steps involved in the operation of one embodiment of the subject invention.

[0031] Figure 8 is a flowchart that shows how the invention can be used to select different HVAC settings based upon its ability to identify which of multiple potential occupants is using the mobile device connected to the system.

[0032] Figures 9a and 9b show how comparing inside temperature against outside temperature and other variables permits calculation of dynamic signatures.

[0033] Figure 10 shows a flow chart for a high level version of the process of calculating the appropriate turn-on time in a given home.

[0034] Figure 11 shows a more detailed flowchart listing the steps in the process of calculating the appropriate turn-on time in a given home for a just-in-time event.

[0035] Figures 12a, 12b, 12c and 12d show the steps shown in the flowchart in Figure 11 in the form of a graph of temperature and time.

[0036] Figure 13 shows a table of some of the data used by an embodiment of the subject invention to predict temperatures.

[0037] Figure 14 shows an embodiment of the subject invention as applied in a specific home on a specific day.

[0038] Figure 15 shows an embodiment of the subject invention as applied in a different specific home on a specific day.

[0039] Figure 16, which includes Figures 16-1 and 16-2, shows a table of predicted rates of change in temperature inside a given home for a range of temperature differentials between inside and outside.

[0040] Figure 17 shows how manual inputs can be recognized and recorded by an embodiment of the subject invention.

[0041] Figure 18 shows how an embodiment of the subject invention uses manual inputs to interpret manual overrides and make short-term changes in response thereto.

[0042] Figure 19 shows how an embodiment of the subject invention uses manual inputs to make long-term changes to interpretive rules and to setpoint scheduling.

[0043] Figure 20 shows a flowchart illustrating the steps required to initiate a compressor delay adjustment event.

[0044] Figure 21a, 21b, and 21c illustrate how changes in compressor delay settings affect HVAC cycling behavior by plotting time against temperature.

[0045] Figure 22 is a flow chart illustrating the steps involved in generating a demand reduction event for a given subscriber.

[0046] Figure 23 is a flow chart illustrating the steps involved in confirming that a demand reduction event has taken place.

[0047] Figure 24 is a representation of the movement of messages and information between the components of an embodiment of the subject invention.

[0048] Figures 25a and 25b show graphical representations of inside and outside temperatures in two different homes, one with high thermal mass and one with low thermal mass.

[0049] Figures 26a and 26b show graphical representations of inside and outside temperatures in the same homes as in Figures 25a and 25b, showing the cycling of the air conditioning systems in those houses.

[0050] Figures 27a and 27b show graphical representations of inside and outside temperatures in the same home as in Figures 25a and 26a, showing the cycling of the air conditioning on two different days in order to demonstrate the effect of a change in operating efficiency on the parameters measured by the thermostat.

[0051] Figures 28a and 28b show the effects of employing a pre-cooling strategy in two different houses.

[0052] Figures 29a and 29b show graphical representations of inside and outside temperatures in two different homes in order to demonstrate how the system can correct for erroneous readings in one house by referencing readings in another.

[0053] Figure 30 is a flowchart illustrating the steps involved in calculating the effective thermal mass of a home using an embodiment of the subject invention.

[0054] Figure 31 is a flowchart illustrating the steps involved in determining whether an HVAC system has developed a problem that impairs efficiency using an embodiment of the subject invention.

[0055] Figure 32 is a flowchart illustrating the steps involved in correcting for erroneous readings in one house by referencing readings in another using an embodiment of the subject invention.

[0056] Figure 33 shows the conventional programming of a programmable thermostat over a 24-hour period.

[0057] Figure 34 shows the programming of a programmable thermostat over a 24-hour period using ramped setpoints.

[0058] Figure 35 shows the steps required for the core function of the ramped setpoint algorithm.

[0059] Figure 36 shows a flowchart listing steps in the process of deciding whether to implement the ramped setpoint algorithm using an embodiment of the subject invention.

[0060] Figure 37 shows the browser as seen on the display of the computer used as part of an embodiment of the subject invention.

[0061] Figure 38 is a flowchart showing the steps involved in the operation of one embodiment of the subject invention.

[0062] Figure 39 is a flowchart that shows how an embodiment of the invention can be used to select different HVAC settings based upon its ability to identify which of multiple potential occupants is using the computer attached to the system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0063] **Figure 1** shows an example of an overall environment 100 in which an embodiment of the invention may be used. The environment 100 includes an

interactive communication network 102 with computers 104 connected thereto. Also connected to network 102 are mobile devices 105, and one or more server computers 106, which store information and make the information available to computers 104 and mobile devices 105. The network 102 allows communication between and among the computers 104, mobile devices 105 and servers 106.

[0064] Presently preferred network 102 comprises a collection of interconnected public and/or private networks that are linked to together by a set of standard protocols to form a distributed network. While network 102 is intended to refer to what is now commonly referred to as the Internet, it is also intended to encompass variations which may be made in the future, including changes additions to existing standard protocols. It also includes various networks used to connect mobile and wireless devices, such as cellular networks.

[0065] When a user of an embodiment of the subject invention wishes to access information on network 102 using computer 104, the user initiates connection from his computer 104. For example, the user invokes a browser, which executes on computer 104. The browser, in turn, establishes a communication link with network 102. Once connected to network 102, the user can direct the browser to access information on server 106.

[0066] One popular part of the Internet is the World Wide Web. The World Wide Web contains a large number of computers 104 and servers 106, which store HyperText Markup Language (HTML) documents capable of displaying graphical and textual information. HTML is a standard coding convention and set of codes for attaching presentation and linking attributes to informational content within documents.

[0067] The servers 106 that provide offerings on the World Wide Web are typically called websites. A website is often defined by an Internet address that has an associated electronic page. Generally, an electronic page is a document that organizes the presentation of text graphical images, audio and video.

[0068] In addition to the Internet, the network 102 can comprise a wide variety of interactive communication media. For example, network 102 can include local area networks, interactive television networks, telephone networks, wireless data systems, two-way cable systems, and the like.

[0069] In one embodiment, computers 104 and servers 106 are conventional computers that are equipped with communications hardware such as modem or a network interface card. The computers include processors such as those sold by Intel and AMD. Other processors may also be used, including general-purpose processors, multi-chip processors, embedded processors and the like.

[0070] Computers 104 can also be microprocessor- controlled home entertainment equipment including advanced televisions, televisions paired with home entertainment/media centers, and wireless remote controls.

[0071] Computers 104 may utilize a browser configured to interact with the World Wide Web. Such browsers may include Microsoft Explorer, Mozilla, Firefox, Opera or Safari. They may also include browsers or similar software used on handheld, home entertainment and wireless devices.

[0072] The storage medium may comprise any method of storing information. It may comprise random access memory (RAM), electronically erasable programmable read only memory (EEPROM), read only memory (ROM), hard disk, floppy disk, CD-ROM, optical memory, or other method of storing data.

[0073] Computers 104 and 106 may use an operating system such as Microsoft Windows, Apple Mac OS, Linux, Unix or the like.

[0074] Computers 106 may include a range of devices that provide information, sound, graphics and text, and may use a variety of operating systems and software optimized for distribution of content via networks.

[0075] Mobile devices 105 can also be handheld and wireless devices such as personal digital assistants (PDAs), cellular telephones and other devices capable of accessing the network. Mobile devices 105 can use a variety of means for establishing the location of each device at a given time. Such methods may include the Global Positioning System (GPS), location relative to cellular towers, connection to specific wireless access points, or other means

[0076] **Figure 2** illustrates in further detail the architecture of the specific components connected to network 102 showing the relationship between the major elements of one embodiment of the subject invention. Attached to the network are thermostats 108 and computers 104 of various users. Connected to thermostats 108

are HVAC units 110. The HVAC units may be conventional air conditioners, heat pumps, or other devices for transferring heat into or out of a building. Each user is connected to the server 106 via wired or wireless connection such as Ethernet or a wireless protocol such as IEEE 802.11, a gateway 110 that connects the computer and thermostat to the Internet via a broadband connection such as a digital subscriber line (DSL), cellular radio or other form of broadband connection to the World Wide Web. Server 106 contains the content to be served as web pages and viewed by computers 104, software to manage thermostats 108, as well as databases containing information used by the servers.

[0077] Also attached to the Network are cellular radio towers 120, or other means to transmit and receive wireless signals in communication with mobile devices 105. Such communication may use GPRS, GSM, CDMA, EvDO, EDGE or other protocols and technologies for connecting mobile devices to a network.

[0078] **Figures 3a** and **3b** shows a representative mobile device 105 from the front and back, respectively. The front of the device includes a display 202, and may include a physical keyboard 204. Alternatively, a virtual keyboard may be included in a display with touchscreen functionality. For devices with voice capabilities, such as a smart phone, a microphone 206 and speaker 208 enable audio communications. An antenna 210, which may be mounted entirely within the mobile device, aids wireless communications. Modules included within mobile device 105 but not visible from the outside may include memory cards, microprocessors, GPS receivers, battery, etc.

[0079] **Figure 4** shows a high-level block diagram of thermostat 108 used as part of an embodiment of the subject invention. Thermostat 108 includes temperature sensing means 252, which may be a thermistor, thermal diode or other means commonly used in the design of electronic thermostats. It includes a microprocessor 254, memory 256, a display 258, a power source 260, a relay 262, which turns the HVAC system on and off in response to a signal from the microprocessor, and contacts by which the relay is connected to the wires that lead to the HVAC system.

[0080] To allow the thermostat to communicate bi-directionally with the computer network, the thermostat also includes means 264 to connect the thermostat to a local computer or to a wireless network. Such means could be in the form of

Ethernet, wireless protocols such as IEEE 802.11, IEEE 802.15.4, Bluetooth, cellular systems such as CDMA, GSM and GPRS, or other wireless protocols. The thermostat 250 may also include controls 266 allowing users to change settings directly at the thermostat, but such controls are not necessary to allow the thermostat to function.

[0081] The data used to manage the subject invention is stored on one or more servers 106 within one or more databases. As shown in **Figure 5**, the overall database structure 300 may include temperature database 400, thermostat settings database 500, energy bill database 600, HVAC hardware database 700, weather database 800, user database 900, transaction database 1000, product and service database 1100, user location database 1200 and such other databases as may be needed to support these and additional features.

[0082] Users of connected thermostats 250 may create personal accounts. Each user's account will store information in database 900, which tracks various attributes relative to users of the site. Such attributes may include the make and model of the specific HVAC equipment in the user's home; the age and square footage of the home, the solar orientation of the home, the location of the thermostat in the home, the user's preferred temperature settings, whether the user is a participant in a demand response program, etc.

[0083] User personal accounts may also associate one or more mobile devices with such personal accounts. For mobile devices with the capability for geopositioning awareness, these personal accounts will have the ability log such positioning data over time in database 1200.

[0084] In one embodiment, a background application installed on mobile device 105 shares geopositioning data for the mobile device with the application running on server 106 that logs such data. Based upon this data, server 106 runs software that interprets said data (as described in more detail below). Server 106 may then, depending on context, (a) transmit a signal to thermostat 108 changing setpoint because occupancy has been detected at a time when the system did not expect occupancy; or (b) transmit a message to mobile device 105 that asks the user if the server should change the current setpoint, alter the overall programming of the system

based upon a new occupancy pattern, etc. Such signalling activity may be conducted via email, text message, pop-up alerts, voice messaging, or other means.

[0085] **Figures 6a** and **6b** illustrate a website that may be provided to assist homeowners and others to interact with an embodiment of the subject invention. The website will permit thermostat users to perform through the web browser substantially all of the programming functions traditionally performed directly at the physical thermostat, such as temperature set points, the time at which the thermostat should be at each set point, etc. Preferably the website will also allow users to accomplish more advanced tasks such as allow users to program in vacation settings for times when the HVAC system may be turned off or run at more economical settings, and to set macros that will allow changing the settings of the temperature for all periods with a single gesture such as a mouse click.

[0086] As shown in **Figure 6a**, screen 351 of website 350 displays current temperature 352 as sensed by thermostat 108. Clicking on “up” arrow 354 raises the setpoint 358; clicking the down arrow 356 lowers setpoint 358. Screen 351 may also convey information about the outside weather conditions, such as a graphic representation 360 of the sun, clouds, etc. In homes with multiple thermostats, screen 351 may allow users to select different devices to adjust or monitor. Users will be able to use screen 351 by selecting, for example, master bedroom thermostat 362, living room thermostat 364, game room thermostat 366, or basement thermostat 368.

[0087] As shown in **Figure 6b**, screen 370 allows users to establish programming schedules. Row 372 shows a 24-hour period. Programming row 374 displays various programming periods and when they are scheduled, such as away setting 376, which begins at approximately 8AM and runs until approximately 5:30PM. When the away setting 376 is highlighted, the user can adjust the starting time and ending time for the setting by dragging the beginning time 378 to the left to choose an earlier start time, and dragging it to the right to make it later. Similarly, the user can drag ending time 380 to the left to make it earlier, and to the right to make it later. While away setting 376 is highlighted, the user can also change heating setpoint 382 by clicking on up arrow 384 or down arrow 386, and cooling setpoint 388 by clicking on up

arrow 390 or down arrow 392. The user can save the program by clicking on save button 394.

[0088] **Figure 7** is a high-level flowchart showing the steps involved in the operation of one embodiment of the subject invention. In step 1302, mobile device 105 transmits geopositioning information to server 106 via the Internet. In step 1304 the server compares the latest geopositioning data point to previous data points in order to determine whether a change in location or vector of movement has occurred. In step 1306 the server evaluates the geopositioning data in order to determine whether the temperature settings for the HVAC system for the structure associated with the mobile device 105 should be optimized for an unoccupied structure, or for an occupied structure in light of the movement (or lack thereof) in the geopositioning data.

[0089] If the server 106 determines that the home should be in occupied or “home” mode, then in step 1308 the server queries database 300 to determine whether thermostat 108 is already set for home or away mode. If thermostat 108 is already in home mode, then the application terminates for a specified interval. If the HVAC settings then in effect are intended to apply when the home is unoccupied, then in step 1310 the application will retrieve from database 300 the user's specific preferences for how to handle this situation.

[0090] If the user has previously specified (at the time that the program was initially set up or subsequently modified) that the user prefers that the system automatically change settings under such circumstances, the application then proceeds to step 1316, in which it changes the programmed setpoint for the thermostat to the setting intended for the house when occupied. If the user has previously specified that the application should not make such changes without further user input, then in step 1312 the application transmits a command to the location specified by the user (generally mobile device 105) directing the device display a message informing the user that the current setting assumes an unoccupied house and asking the user to choose whether to either keep the current settings or revert to the pre-selected setting for an occupied home.

[0091] If the user elects to retain the current setting, then in step 1318 the application will write to database 300 the fact that the user has so elected and

terminate. If the user elects to change the setting, then in step 1316 the application transmits the revised setpoint to the thermostat. In step 1318 the application writes the updated setting information to database 300.

[0092] If the server 106 determines in step 1306 that the home should be in unoccupied or away mode, then in step 1350 the server queries database 300 to determine whether thermostat 108 is set for set for home or away mode. If thermostat 108 is already in away mode, then the application terminates for a specified interval. If the HVAC settings then in effect are intended to apply when the home is occupied, then in step 1352 the application will retrieve from database 300 the user's specific preferences for how to handle this situation.

[0093] If the user has previously specified (at the time that the program was initially set up or subsequently modified) that the user prefers that the system automatically change settings under such circumstances, the application then proceeds to step 1358, in which it changes the programmed setpoint for the thermostat to the setting intended for the house when unoccupied. If the user has previously specified that the application should not make such changes without further user input, then in step 1354 the application transmits a command to the location specified by the user (generally mobile device 105) directing the device display a message informing the user that the current setting assumes an unoccupied house and asking the user to choose whether to either keep the current settings or revert to the pre-selected setting for an occupied home. If the user selects to retain the current setting, then in step 1318 the application will write to database 300 the fact that the user has so elected and terminate.

[0094] If the user elects to change the setting, then in step 1316 the application transmits the revised setpoint to the thermostat. In step 1318 the application writes the updated setting information to database 300. If thermostat 108 is already in away mode, the program ends. If it was in home mode, then in step 1314 server 108 initiates a state change to put thermostat 108 in away mode. In either case, the server then in step 1316 writes the state change to database 300. In each case the server can also send a message to the person who owns the mobile device requesting, confirming or announcing the state change.

[0095] **Figure 8** is a flowchart that shows one process by which an embodiment of the invention can be used to select different HVAC settings based upon its ability to identify which of multiple potential occupants is using the mobile device attached to the system. The process shown assumes (a) a static hierarchy of temperature preferences as between multiple occupants: that is, that for a given home/structure, mobile user #1's preferences will always control the outcome if mobile user #1 is present, that mobile user #2's preferences yield to #1's, but always prevail over user #3, etc; and (b) that there are no occupants to consider who are not associated with a mobile device. Other heuristics may be applied in order to account for more dynamic interactions of preferences.

[0096] In step 1402 server 106 retrieves the most recent geospatial coordinates from the mobile device 105 associated with mobile user #1. In step 1404 server 106 uses current and recent coordinates to determine whether mobile user #1's "home" settings should be applied. If server 106 determines that User #1's home settings should be applied, then in step 1406 server 106 applies the correct setting and transmits it to the thermostat(s).

[0097] In step 1408, server 106 writes to database 300 the geospatial information used to adjust the programming. If after performing step 1404, the server concludes that mobile user #1's "home" settings should not be applied, then in step 1412 server 106 retrieves the most recent geospatial coordinates from the mobile device 105 associated with mobile user #2.

[0098] In step 1414 server 106 uses current and recent coordinates to determine whether mobile user #2's "home" settings should be applied. If server 106 determines that User #2's home settings should be applied, then in step 1416 server 106 applies the correct setting and transmits it to the thermostat(s).

[0099] In step 1408, server 106 writes to database 300 the geospatial and other relevant information used to adjust the programming. If after performing step 1414, the server concludes that mobile user #2's "home" settings should not be applied, then in step 1422 server 106 retrieves the most recent geospatial coordinates from the mobile device 105 associated with mobile user #N.

[0100] In step 1424 server 106 uses current and recent coordinates to determine whether mobile user #N's "home" settings should be applied. If server 106 determines that User #N's home settings should be applied, then in step 1426 server 106 applies the correct setting and transmits it to the thermostat(s). In step 1408, server 106 writes to database 300 the geospatial information used to adjust the programming.

[0101] If none of the mobile devices associated with a given home or other structure report geospatial coordinates consistent with occupancy, then in step 1430 the server instructs the thermostat(s) to switch to or maintain the "away" setting.

[0102] One embodiment of the invention is capable of delivering additional benefits for homeowners in terms of increased comfort and efficiency. In addition to using the system to allow better signaling and control of the HVAC system, which relies primarily on communication running from the server to the thermostat, the bi-directional communication will also allow the thermostat 108 to regularly measure and send to the server information about the temperature in the building. By comparing outside temperature, inside temperature, thermostat settings, cycling behavior of the HVAC system, and other variables, the system will be capable of numerous diagnostic and controlling functions beyond those of a standard thermostat.

[0103] For example, **Figure 9a** shows a graph of inside temperature, outside temperature and HVAC activity for a 24 hour period. When outside temperature 1502 increases, inside temperature 1504 follows, but with some delay because of the thermal mass of the building, unless the air conditioning 1506 operates to counteract this effect. When the air conditioning turns on, the inside temperature stays constant (or rises at a much lower rate or even falls) despite the rising outside temperature. In this example, frequent and heavy use of the air conditioning results in only a very slight temperature increase inside the house of 4 degrees, from 72 to 76 degrees, despite the increase in outside temperature from 80 to 100 degrees.

[0104] **Figure 9b** shows a graph of the same house on the same day, but assumes that the air conditioning is turned off from noon to 7PM. As expected, the inside temperature 1504a rises with increasing outside temperatures 1502 for most of that period, reaching 88 degrees at 7PM. Because server 106 logs the temperature

readings from inside each house (whether once per minute or over some other interval), as well as the timing and duration of air conditioning cycles, database 300 will contain a history of the thermal performance of each house.

[0105] The performance data will allow the server 106 to calculate an effective thermal mass for each such structure – that is, the rate at which the temperature inside a given building will change in response to changes in outside temperature. Because the server will also log these inputs against other inputs including time of day, humidity, etc., the server will be able to predict, at any given time on any given day, the rate at which inside temperature should change for given inside and outside temperatures.

[0106] The ability to predict the rate of change in inside temperature in a given house under varying conditions may be applied by in effect holding the desired future inside temperature as a constraint and using the ability to predict the rate of change to determine when the HVAC system must be turned on in order to reach the desired temperature at the desired time. The ability of an HVAC system to vary turn-on time in order to achieve a setpoint with minimum energy use may be thought of as Just In Time (JIT) optimization.

[0107] **Figure 10** shows a flowchart illustrating the high-level process for controlling a just-in-time (JIT) event. In step 1512, the server determines whether a specific thermostat 108 is scheduled to run the preconditioning program. If, not, the program terminates. If it so scheduled, then in step 1514 the server retrieves the predetermined target time when the preconditioning is intended to have been completed (TT).

[0108] Using TT as an input, in step 1516 the server then determines the time at which the computational steps required to program the preconditioning event will be performed (ST). In step 1518, performed at start time ST, the server begins the process of actually calculating the required parameters, as discussed in greater detail below. Then in 1520 specific setpoint changes are transmitted to the thermostat so that the temperature inside the home may be appropriately changed as intended.

[0109] **Figure 11** shows a more detailed flowchart of the process. In step 1532, the server retrieves input parameters used to create a JIT event. These

parameters include the maximum time allowed for a JIT event for thermostat 108 (MTI); the target time the system is intended to hit the desired temperature (TT); and the desired inside temperature at TT (TempTT). It is useful to set a value for MTI because, for example, it will be reasonable to prevent the HVAC system from running a preconditioning event if it would be expected to take 8 hours, which might be prohibitively expensive.

[0110] In step 1534, the server retrieves data used to calculate the appropriate start time with the given input parameters. This data includes a set of algorithmic learning data (ALD), composed of historic readings from the thermostat, together with associated weather data, such as outside temperature, solar radiation, humidity, wind speed and direction, etc; together with weather forecast data for the subject location for the period when the algorithm is scheduled to run (the weather forecast data, or WFD). The forecasting data can be as simple as a listing of expected temperatures for a period of hours subsequent to the time at which the calculations are performed, to more detailed tables including humidity, solar radiation, wind, etc. Alternatively, it can include additional information such as some or all of the kinds of data collected in the ALD.

[0111] In step 1536, the server uses the ALD and the WFD to create prediction tables that determine the expected rate of change or slope of inside temperature for each minute of HVAC cycle time (ΔT) for the relevant range of possible pre-existing inside temperatures and outside climatic conditions. An example of a simple prediction table is illustrated in Fig. 13.

[0112] In step 1538, the server uses the prediction tables created in step 1536, combined with input parameters TT and Temp(TT) to determine the time at which slope ΔT intersects with predicted initial temperature PT. The time between PT and TT is the key calculated parameter: the preconditioning time interval, or PTI.

[0113] In step 1540, the server checks to confirm that the time required to execute the pre-conditioning event PTI does not exceed the maximum parameter MTI. If PTI exceeds MTI, the scheduling routine concludes and no ramping setpoints are transmitted to the thermostat.

[0114] If the system is perfect in its predictive abilities and its assumptions about the temperature inside the home are completely accurate, then in theory the thermostat can simply be reprogrammed once – at time PT, the thermostat can simply be reprogrammed to Temp(TT). However, there are drawbacks to this approach.

[0115] First, if the server has been overly conservative in its predictions as to the possible rate of change in temperature caused by the HVAC system, the inside temperature will reach TT too soon, thus wasting energy and at least partially defeating the purpose of running the preconditioning routine in the first place. If the server is too optimistic in its projections, there will be no way to catch up, and the home will not reach Temp(TT) until after TT. Thus it would be desirable to build into the system a means for self-correcting for slightly conservative start times without excessive energy use.

[0116] Second, the use of setpoints as a proxy for actual inside temperatures in the calculations is efficient, but can be inaccurate under certain circumstances. In the winter (heating) context, for example, if the actual inside temperature is a few degrees above the setpoint (which can happen when outside temperatures are warm enough that the home's natural "set point" is above the thermostat setting), then setting the thermostat to Temp(TT) at time PT will almost certainly lead to reaching TT too soon as well.

[0117] The currently preferred solution to both of these possible inaccuracies is to calculate and program a series of intermediate settings between Temp(PT) and Temp(TT) that are roughly related to ΔT .

[0118] Thus if MTI is greater than PTI, then in step 1542 the server calculates the schedule of intermediate setpoints and time intervals to be transmitted to the thermostat. Because thermostats cannot generally be programmed with steps of less than 1 degree F, ΔT is quantized into discrete interval data of at least 1 degree F each. For example, if Temp(PT) is 65 degrees F, Temp(TT) is 72 degrees F, and PT is 90 minutes, the thermostat might be programmed to be set at 66 for 10 minutes, 67 for 12 minutes, 68 for 15 minutes, etc.

[0119] The server may optionally limit the process by assigning a minimum programming interval (e.g., at least ten minutes between setpoint changes) to avoid

frequent switching of the HVAC system, which can reduce accuracy because of the thermostat's compressor delay circuit, which may prevent quick corrections. The duration of each individual step may be a simple arithmetic function of the time PTI divided by the number of whole-degree steps to be taken; alternatively, the duration of each step may take into account second order thermodynamic effects relating to the increasing difficulty of "pushing" the temperature inside a house further from its natural setpoint given outside weather conditions, etc. (that is, the fact that on a cold winter day it may take more energy to move the temperature inside the home from 70 degrees F to 71 than it does to move it from 60 degrees to 61).

[0120] In step 1544, the server schedules setpoint changes calculated in step 1542 for execution by the thermostat.

[0121] With this system, if actual inside temperature at PT is significantly higher than Temp(PT), then the first changes to setpoints will have no effect (that is, the HVAC system will remain off), and the HVAC system will not begin using energy, until the appropriate time, as shown in **Figure 12**. Similarly, if the server has used conservative predictions to generate ΔT , and the HVAC system runs ahead of the predicted rate of change, the incremental changes in setpoint will delay further increases until the appropriate time in order to again minimize unnecessary energy use, as shown in **Figure 11**.

[0122] **Figure 12(a)** through **12(d)** shows the steps in the preconditioning process as a graph of temperature and time. **Figure 12(a)** shows step 1532, in which inputs target time TT 1552, target temperature Temp(TT) 1554, maximum conditioning interval MTI 1556 and the predicted inside temperature during the period of time the preconditioning event is likely to begin Temp(PT) 1558 are retrieved.

[0123] **Figure 12(b)** shows the initial calculations performed in step 1538, in which expected rate of change in temperature ΔT 1560 inside the home is generated from the ALD and WFD using Temp(TT) 1554 at time TT 1552 as the endpoint.

[0124] **Figure 12(c)** shows how in step 1538 ΔT 1560 is used to determine start time PT 1562 and preconditioning time interval PTI 1564. It also shows how in step 1540 the server can compare PTI with MTI to determine whether or not to instantiate the pre-conditioning program for the thermostat.

[0125] **Figure 12(d)** shows step 1542, in which specific ramped setpoints 1566 are generated. Because of the assumed thermal mass of the system, actual inside temperature at any given time will not correspond to setpoints until some interval after each setpoint change. Thus initial ramped setpoint 1216 may be higher than Temp(PT) 1558, for example.

[0126] **Figure 13** shows an example of the types of data that may be used by the server in order to calculate ΔT 1560. Such data may include inside temperature 1572, outside temperature 1574, cloud cover 1576, humidity 1578, barometric pressure 1580, wind speed 1582, and wind direction 1584.

[0127] Each of these data points should be captured at frequent intervals. In the preferred embodiment, as shown in **Figure 13**, the interval is once every 60 seconds.

[0128] **Figure 14** shows application of an embodiment of the subject invention in an actual house. Temperature and setpoints are plotted for the 4-hour period from 4AM to 8AM with temperature on the vertical axis and time on the horizontal axis. The winter nighttime setpoint 1592 is 60 degrees F; the morning setpoint temperature 1594 is 69 degrees F. The outside temperature 1596 is approximately 45 degrees F. The target time TT 1598 for the setpoint change to morning setting is 6:45AM. In the absence of embodiments of the subject invention, the homeowner could program the thermostat to change to the new setpoint at 6:45, but there is an inherent delay between a setpoint change and the response of the temperature inside the home. (In this home on this day, the delay is approximately fifty minutes.) Thus if the homeowner truly desired to achieve the target temperature at the target time, some anticipation would be necessary. The amount of anticipation required depends upon numerous variables, as discussed above.

[0129] After calculating the appropriate slope ΔT 1560 by which to ramp inside temperature in order to reach the target as explained above, the server transmits a series of setpoints 1566 to the thermostat because the thermostat is presumed to only accept discrete integers as program settings. (If a thermostat is capable of accepting finer settings, as in the case of some thermostats designed to operate in

regions in which temperature is generally denoted in Centigrade rather than Fahrenheit, which accept settings in half-degree increments, tighter control may be possible.)

[0130] In any event, in the currently preferred embodiment of the subject invention, programming changes are quantized such that the frequency of setpoint changes is balanced between the goal of minimizing network traffic and the frequency of changes made on the one hand and the desire for accuracy on the other. Balancing these considerations may result in some cases in either more frequent changes or in larger steps between settings. As shown in Fig. 14, the setpoint “stairsteps” from 60 degrees F to 69 degrees F in nine separate setpoint changes over a period of 90 minutes.

[0131] Because the inside temperature 1599 when the setpoint management routine was instantiated at 5:04 AM was above the “slope” and thus above the setpoint, the HVAC system was not triggered and no energy was used unnecessarily heating the home before such energy use was required. Actual energy usage does not begin until 5:49 AM.

[0132] **Figure 15** shows application of an embodiment of the subject invention in a different house during a similar four hour interval. In **Figure 15**, the predicted slope ΔT 1560 is less conservative relative to the actual performance of the home and HVAC system, so there is no off cycling during the preconditioning event – the HVAC system turns on at approximately 4:35 AM and stays on continuously during the event. The home reaches the target temperature Temp(TT) roughly two minutes prior to target time TT.

[0133] **Figure 16** shows a simple prediction table. The first column 1602 lists a series of differentials between outside and inside temperatures. Thus when the outside temperature is 14 degrees and the inside temperature is 68 degrees, the differential is -54 degrees; when the outside temperature is 94 degrees and the inside temperature is 71 degrees, the differential is 13 degrees. The second column 1604 lists the predicted rate of change in inside temperature ΔT 1210 assuming that the furnace is running in terms of degrees Fahrenheit of change per hour. A similar prediction table will be generated for predicted rates of change when the air conditioner

is on; additional tables may be generated that predict how temperatures will change when the HVAC system is off.

[0134] Alternatively, the programming of the just-in-time setpoints may be based not on a single rate of change for the entire event, but on a more complex multivariate equation that takes into account the possibility that the rate of change may be different for events of different durations.

[0135] The method for calculating start times may also optionally take into account not only the predicted temperature at the calculated start time, but may incorporate measured inside temperature data from immediately prior to the scheduled start time in order to update calculations, or may employ more predictive means to extrapolate what inside temperature based upon outside temperatures, etc.

[0136] An additional capability offered by an embodiment of the instant invention is the ability to adapt the programming of the HVAC control system based upon the natural behavior of occupants. Because an embodiment of the instant invention is capable of recording the setpoint actually used at a connected thermostat over time, it is also capable of inferring manual setpoint changes (as, for example, entered by pushing the “up” or “down” arrow on the control panel of the device) even when such overrides of the pre-set program are not specifically recorded as such by the thermostat.

[0137] In order to adapt programming to take into account the manual overrides entered into the thermostat, it is first necessary to determine when a manual override has in fact occurred. Most thermostats, including two-way communicating devices discussed herein, do not record such inputs locally, and neither recognize nor transmit the fact that a manual override has occurred. Furthermore, in a system as described herein, frequent changes in setpoints may be initiated by algorithms running on the server, thereby making it impossible to infer a manual override from the mere fact that the setpoint has changed. It is therefore necessary to deduce the occurrence of such events from the data that an embodiment of the subject invention does have access to.

[0138] **Figure 17** illustrates the currently preferred method for detecting the occurrence of a manual override event. In step 1702, the server retrieves the primary

data points used to infer the occurrence of a manual override from one or more databases in overall database structure 300. The data should include each of the following: for the most recent point at which it can obtain such data (time0) the actual setpoint as recorded at the thermostat at (A0); for the point immediately prior to time0 (time-1), the actual setpoint recorded for the thermostat (A-1); for time0 the setpoint as scheduled by server 106 according to the basic setpoint programming (S0), and for time-1 the setpoint as scheduled by server 106 according to the standard setpoint programming (S-1).

[0139] In step 1704, the server retrieves any additional automated setpoint changes C that have been scheduled for the thermostat by server 106 at time0. Such changes may include algorithmic changes intended to reduce energy consumption, etc.

[0140] In step 1706 the server calculates the difference (dA) between A0 and A-1; for example, if the actual setpoint is 67 degrees at T-1 and 69 at T0, dA is +2; if the setpoint at T-1 is 70 and the setpoint at T0 is 66, dA is -4.

[0141] In step 1708, the server performs similar steps in order to calculate dS, the difference between S0 and S-1. This is necessary because, for example, the setpoint may have been changed because the server itself had just executed a change, such as a scheduled change from “away” to “home” mode. In step 1710 the server evaluates and sums all active algorithms and other server-initiated strategies to determine their net effect on setpoint at time0. For example, if one algorithm has increased setpoint at time0 by 2 degrees as a short-term energy savings measure, but another algorithm has decreased the setpoint by one degree to compensate for expected subjective reactions to weather conditions, the net algorithmic effect sC is +1 degree.

[0142] In step 1712, the server calculates the value for M, where M is equal to the difference between actual setpoints dA, less the difference between scheduled setpoints dS, less the aggregate of algorithmic change sC.

[0143] In step 1714 the server evaluates this difference. If the difference equals zero, the server concludes that no manual override has occurred, and the routine terminates. But if the difference is any value other than zero, then the server concludes that a manual override has occurred. Thus in step 1716 the server logs the

occurrence and magnitude of the override to one or more databases in overall database structure 300.

[0144] The process of interpreting a manual override is shown in **Figure 18**. Step 1802 is the detection of an override, as described in detail in **Figure 17**. In step 1804 the server retrieves the stored rules for the subject thermostat 108. Such rules may include weather and time-related inferences such as “if outside temperature is greater than 85 degrees and inside temperature is more than 2 degrees above setpoint and manual override lowers setpoint by 3 or more degrees, then revert to original setpoint in 2 hours,” or “if heating setpoint change is scheduled from “away” to “home” within 2 hours after detected override, and override increases setpoint by at least 2 degrees, then change to “home” setting,” or the like.

[0145] In step 1806 the server retrieves contextual data required to interpret the manual override. Such data may include current and recent weather conditions, current and recent inside temperatures, etc. This data is helpful because it is likely that manual overrides are at least in part deterministic: that is, that they may often be explained by such contextual data, and that such understanding can permit anticipation of the desire on the part of the occupants to override and to adjust programming accordingly, so as to anticipate and obviate the need for such changes. The amount of data may be for a period of a few hours to as long as several days or more. Recent data may be more heavily weighted than older data in order to assure rapid adaptation to situations in which manual overrides represent stable changes such as changes in work schedules, etc.

[0146] In step 1808 the server retrieves any relevant override data from the period preceding the specific override being evaluated that has not yet been evaluated by and incorporated into the long-term programming and rules engines as described below in **Figure 19**. In step 1810 the server evaluates the override and determines which rule, if any, should be applied as a result of the override.

[0147] In step 1812 the server determines whether to alter the current setpoint as a result of applying the rules in step 1810. If no setpoint change is indicated, then the routine ends. If a setpoint change is indicated, then in step 1814 the server transmits the setpoint change to the thermostat for execution in the home, and in

step 1816 it records that change to one or more databases in overall database structure 300.

[0148] In order to ensure that both the stored rules for interpreting manual overrides and the programming itself continue to most accurately reflect the intentions of the occupants, the server will periodically review both the rules used to interpret overrides and the setpoint scheduling employed. **Figure 19** shows the steps used to incorporate manual overrides into the long-term rules and setpoint schedule. In step 1902 the server retrieves the stored programming for a given thermostat as well as the rules for interpreting overrides for that thermostat.

[0149] In step 1904 the server retrieves the recent override data as recorded in **Figures 17** and **18** to be evaluated for possible revisions to the rules and the programming. In step 1906 the server retrieves the contextual data regarding overrides retrieved in step 1904 (Because the process illustrated in **Figure 19** is not presently expected to be executed as a real-time process, and is expected to be run anywhere from once per day to once per month, the range and volume of contextual data to be evaluated is likely to be greater than in the process illustrated in **Figure 18**).

[0150] In step 1908 the server interprets the overrides in light of the existing programming schedule, rules for overrides, contextual data, etc. In step 1910 the server determines whether, as a result of those overrides as interpreted, the rules for interpreting manual overrides should be revised. If the rules are not to be revised, the server moves to step 1914. If the rules are to be revised, then in step 1912 the server revises the rules and the new rules are stored in one or more databases in overall database structure 300.

[0151] In step 1914 the server determines whether any changes to the baseline programming for the thermostat should be revised. If not, the routine terminates. If revisions are warranted, then in step 1916 the server retrieves from database 900 the permissions the server has to make autonomous changes to settings. If the server has been given permission to make the proposed changes, then in step 1918 the server revises the thermostat's programming and writes the changes to one or more databases in overall database structure 300.

[0152] If the server has not been authorized to make such changes autonomously, then in step 1920 the server transmits the recommendation to change settings to the customer in the manner previously specified by the customer, such as email, text message, personalized website, etc.

[0153] Additional means of implementing an embodiment of the instant invention may be achieved using variations in system architecture. For example, much or even all of the work being accomplished by remote server 106 may also be done by thermostat 108 if that device has sufficient processing capabilities, memory, etc. Alternatively, these steps may be undertaken by a local processor such as a local personal computer, or by a dedicated appliance having the requisite capabilities, such as gateway 112.

[0154] An additional way in which an embodiment of the instant invention can reduce energy consumption with minimal impact on comfort is to vary the turn-on delay enforced by the thermostat after the compressor is turned off. Compressor delay is usually used to protect compressors from rapid cycling, which can physically damage them.

[0155] The ability to predict the rate of change in inside temperature in a given house under varying conditions may also be applied to permit calculation of the effect of different compressor delay settings on inside temperatures, HVAC cycling and energy consumption.

[0156] **Figure 20** shows a flowchart illustrating the steps required to initiate a compressor delay adjustment event. In step 2002, server 106 retrieves parameters such as weather conditions, the current price per kilowatt-hour of electricity, and the state of the electric grid in terms of supply versus demand for the geographic area that includes a given home. In step 2004 server 106 determines whether to instantiate the compressor delay adjustment program for a certain group of homes in response to those conditions.

[0157] In step 2006, server 106 determines whether a specific home is subscribed to participate in compressor delay events. If a given home is eligible, then in step 2008 the server retrieves the parameters needed to specify the compressor delay routine for that home. These may include user preferences, such as the weather,

time of day and other conditions under which the homeowner has elected to permit hysteresis band changes, the maximum length of compressor delay authorized, etc.

[0158] In step 2010 the appropriate compressor delay settings are determined, and in step 2012 the chosen settings are communicated to the thermostat. In step 2014 the server determines if additional thermostats in the given group must still be evaluated. If so, the server returns to step 2006 and repeats the subsequent steps with the next thermostat. If not, the routine ends.

[0159] **Figures 21(a)** through **21(c)** illustrate how changes in compressor delay settings affect HVAC cycling behavior by plotting time against temperature. In **Figure 21(a)**, time is shown on the horizontal axis 2102, and temperature is shown on vertical axis 2104. The setpoint for thermostat 108 is 70 degrees F, which results in the cycling behavior shown for inside temperature 2106. Because compressor delay CD1 2108 is, at approximately 3 minutes, shorter than the natural duration of a compressor off cycle Off1 2110 at approximately 6 minutes for this particular house under the illustrated conditions, the compressor delay has no effect on the operation of the HVAC system.

[0160] Because the hysteresis band operates to so as to maintain the temperature within a range of plus or minus one degree of the setpoint, in the case of air conditioning the air conditioner will switch on when the inside temperature reaches 71 degrees, continue operating until it reaches 69 degrees, then shut off. The system will then remain off until it reaches 71 degrees again, at which time it will again switch on. The percentage of time during which inside temperature is above or below the setpoint will depend on conditions and the dynamic signature of the individual, home. Under the conditions illustrated, the average inside temperature AT1 2112 is roughly equal to the setpoint of 70 degrees.

[0161] **Figure 21(b)** shows how with the same environmental conditions as in **Figure 21(a)**, the cycling behavior of the inside temperature changes when the compressor delay is longer than the natural compressor off cycle Off1 2110. Extended compressor delay CD2 2114 allows inside temperature 2116 to climb above the range normally enforced by the hysteresis band. Because CD2 is roughly 8 minutes, under the given conditions the inside temperature climbs to approximately 72 degrees before

the compressor delay allows the air conditioner to restart and drive the inside temperature back down. But as before, the air conditioner shuts off when the inside temperature reaches 69 degrees. Thus the average temperature is increased from AT1 2112 to AT2 2118. This change will save energy and reduce cycling because it takes less energy to maintain a higher inside temperature with an air conditioner. However, the setpoint reported by the display of the thermostat will continue to be the occupant's chosen setpoint of 70 degrees.

[0162] **Figure 21(c)** shows how the same compressor delay can result in different thermal cycling with different weather conditions. The greater the amount by which outside temperature exceeds inside temperature in the air conditioning context, the more rapidly the inside temperature will increase during an off cycle, and the slower the air conditioner will be able to cool during the on cycle. Thus as compared to **Figure 21(b)**, when the inside temperature increased to roughly 72 degrees during the extended compressor delay of 8 minutes, a higher outside temperature will cause the inside temperature to increase faster, which results in a peak temperature of roughly 73 degrees, and in wider temperature cycling 2120. The average inside temperature consequently increases from AT(2) 2118 to AT(3) 2122.

[0163] It should be noted that the shape of the actual waveform will most likely not be sinusoidal, but for ease of illustration it is sometimes be presented as such in the figures.

[0164] Residential air conditioning is a major component of peak load. The traditional approach to dealing with high demand on hot days is to increase supply – build new powerplants, or buy additional capacity on the spot market. But because reducing loads has come to be considered by many to be a superior strategy for matching electricity supply to demand when the grid is stressed, the ability to shed load by turning off air conditioners during peak events has become a useful tool for managing loads. A key component of any such system is the ability to document and verify that a given air conditioner has actually turned off. Data logging hardware can accomplish this, but due to the cost is usually only deployed for statistical sampling. An embodiment of the instant invention provides a means to verify demand response without additional hardware such as a data logger.

[0165] Because server 106 logs the temperature readings from inside each house (whether once per minute or over some other interval), as well as the timing and duration of air conditioning cycles, database 300 will contain a history of the thermal performance of each house. That performance data will allow the server 106 to calculate an effective thermal mass for each such structure – that is, the speed with the temperature inside a given building will change in response to changes in outside temperature. Because the server will also log these inputs against other inputs including time of day, humidity, etc. the server will be able to predict, at any given time on any given day, the rate at which inside temperature should change for given inside and outside temperatures. This will permit remote verification of load shedding by the air conditioner without directly measuring or recording the electrical load drawn by the air conditioner.

[0166] **Figure 22** shows the steps followed in order to initiate air conditioner shutoff. When a summer peak demand situation occurs, the utility will transmit an email 2202 or other signal to server 106 requesting a reduction in load. Server 106 will determine 2204 if the user's house is served by the utility seeking reduction; determine 2206 if a given user has agreed to reduce peak demand; and determine 2208 if a reduction of consumption by the user is required or desirable in order to achieve the reduction in demand requested by the utility. The server will transmit 2210 a signal to the user's thermostat 108 signaling the thermostat to shut off the air conditioner 110.

[0167] **Figure 23** shows the steps followed in order to verify that the air conditioner has in fact been shut off. Server 106 will receive and monitor 2302 the temperature readings sent by the user's thermostat 108. The server then calculates 2304 the temperature reading to be expected for that thermostat given inputs such as current and recent outside temperature, recent inside temperature readings, the calculated thermal mass of the structure, temperature readings in other houses, etc. The server will compare 2306 the predicted reading with the actual reading. If the server determines that the temperature inside the house is rising at the rate predicted if the air conditioning is shut off, then the server confirms 2308 that the air conditioning has been shut off. If the temperature reading from the thermostat shows no increase, or significantly less increase than predicted by the model, then the server concludes

2310 that the air conditioning was not switched off, and that no contribution to the demand response request was made.

[0168] For example, assume that on at 3PM on date Y utility X wishes to trigger a demand reduction event. A server at utility X transmits a message to the server at demand reduction service provider Z requesting W megawatts of demand reduction. The demand reduction service provider server determines that it will turn off the air conditioner at house A in order to achieve the required demand reduction. At the time the event is triggered, the inside temperature as reported by the thermostat in house A is 72 degrees F. The outside temperature near house A is 96 degrees Fahrenheit. The inside temperature at House B, which is not part of the demand reduction program, but is both connected to the demand reduction service server and located geographically proximate to House A, is 74F. Because the air conditioner in house A has been turned off, the temperature inside House A begins to rise, so that at 4PM it has increased to 79F. Because the server is aware of the outside temperature, which remains at 96F, and of the rate of temperature rise inside house A on previous days on which temperatures have been at or near 96F, and the temperature in house B, which has risen only to 75F because the air conditioning in house B continues to operate normally, the server is able to confirm with a high degree of certainty that the air conditioner in house A has indeed been shut off.

[0169] In contrast, if the HVAC system at house A has been tampered with, so that a demand reduction signal from the server does not actually result in shutting off the air conditioner in house A, when the server compares the rate of temperature change at house A against the other data points, the server will receive data inconsistent with the rate of increase predicted. As a result, it will conclude that the air conditioner has not been shut off in house A as expected, and may not credit house A with the financial credit that would be associated with demand reduction compliance, or may trigger a business process that could result in termination of house A's participation in the demand reduction program.

[0170] **Figure 24** illustrates the movement of signals and information between the components of one embodiment of the subject invention to trigger and verify a demand reduction response. Where demand response events are undertaken on

behalf of a utility by a third party, participants in the communications may include electric utility server 2400, demand reduction service server 106, and thermostat 108. In step 2402 the electric utility server 2400 transmits a message to demand reduction service server 106 requesting a demand reduction of a specified duration and size. Demand reduction service server 106 uses database 300 to determine which subscribers should be included in the demand reduction event. For each included subscriber, the server then sends a signal 2404 to the subscriber's thermostat 108 instructing it (a) to shut down at the appropriate time or (b) to allow the temperature as measured by the thermostat to increase to a certain temperature at the specified time, depending upon the agreement between the homeowner and the utility and/or demand reduction aggregator.

[0171] The server then receives 2406 temperature signals from the subscriber's thermostat. At the conclusion of the demand reduction event, the server transmits a signal 2408 to the thermostat permitting the thermostat to signal its attached HVAC system to resume cooling, if the system has been shut off, or to reduce the target temperature to its pre-demand reduction setting, if the target temperature was merely increased. If thermostat 108 is capable of storing scheduling information, these instructions may be transmitted prior to the time they are to be executed and stored locally. After determining the total number of subscribers actually participating in the DR event, the server then calculates the total demand reduction achieved and sends a message 2410 to the electric utility confirming such reduction.

[0172] Additional steps may be included in the process. For example, if the subscriber has previously requested that notice be provided when a peak demand reduction event occurs, the server will also send an alert, which may be in the form of an email or text message or an update to the personalized web page for that user, or both. If the server determines that a given home has (or has not) complied with the terms of its demand reduction agreement, the server may send a message to the subscriber confirming that fact.

[0173] It should also be noted that in some climate zones, peak demand events occur during extreme cold weather rather than (or in addition to) during hot

weather. The same process as discussed above could be employed to reduce demand by shutting off electric heaters and monitoring the rate at which temperatures fall.

[0174] It should also be noted that the peak demand reduction service can be performed directly by an electric utility, so that the functions of server 106 can be combined with the functions of server 2400.

[0175] The system installed in a subscriber's home may optionally include additional temperature sensors at different locations within the building. These additional sensors may be connected to the rest of the system via a wireless system such as 802.11 or 802.15.4, or may be connected via wires. Additional temperature and/or humidity sensors may allow increased accuracy of the system, which can in turn increase user comfort, energy savings or both.

[0176] The bi-directional communication between server 106 and thermostat 108 will also allow thermostat 108 to regularly measure and send to server 106 information about the temperature in the building. By comparing outside temperature, inside temperature, thermostat settings, cycling behavior of the HVAC system, and other variables, the system will be capable of numerous diagnostic and controlling functions beyond those of a standard thermostat.

[0177] For example, **Figure 25a** shows a graph of inside temperature and outside temperature for a 24-hour period in House A, assuming no HVAC activity. House A has double-glazed windows and is well-insulated. When outside temperature 2502 increases, inside temperature 2504 follows, but with significant delay because of the thermal mass of the building.

[0178] **Figure 25b** shows a graph of inside temperature and outside temperature for the same 24-hour period in House B. House B is identical to House A except that it (i) is located a block away and (ii) has single-glazed windows and is poorly insulated. Because the two houses are so close to each other, outside temperature 2502 is the same in **Figure 25a** and **Figure 25b**. But the lower thermal mass of House B means that the rate at which the inside temperature 2506 changes in response to the changes in outside temperature is much greater.

[0179] The differences in thermal mass will affect the cycling behavior of the HVAC systems in the two houses as well. **Figure 26a** shows a graph of inside

temperature and outside temperature in House A for the same 24-hour period as shown in **Figure 6a**, but assuming that the air conditioning is being used to try to maintain an internal temperature of 70 degrees. Outside temperatures 2502 are the same as in **Figures 25a** and **25b**. Inside temperature 2608 is maintained within the range determined by thermostat 108 by the cycling of the air conditioner. Because of the high thermal mass of the house, the air conditioning does not need to run for very long to maintain the target temperature, as shown by shaded areas 2610.

[0180] **Figure 26b** shows a graph of inside temperature 2612 and outside temperature 2502 for the same 24-hour period in House B, assuming use of the air conditioning as in **Figure 26a**. Because of the lower thermal mass of House B, the air conditioning system in House B has to run longer in order to maintain the same target temperature range, as shown by shaded areas 2614.

[0181] Because server 106 logs the temperature readings from inside each house (whether once per minute or over some other interval), as well as the timing and duration of air conditioning cycles, database 300 will contain a history of the thermal performance of each house. That performance data will allow the server 106 to calculate an effective thermal mass for each such structure – that is, the speed with the temperature inside a given building will change in response to changes in outside temperature and differences between inside and outside temperatures. Because the server 106 will also log these inputs against other inputs including time of day, humidity, etc. the server will be able to predict, at any given time on any given day, the rate at which inside temperature should change for given inside and outside temperatures.

[0182] The server will also record the responses of each house to changes in outside conditions and cycling behavior over time. That will allow the server to diagnose problems as and when they develop. For example, **Figure 27a** shows a graph of outside temperature 2702, inside temperature 2704 and HVAC cycle times 2706 in House A for a specific 24-hour period on date X. Assume that, based upon comparison of the performance of House A on date X relative to House A's historical performance, and in comparison to the performance of House A relative to other nearby houses on date X, the HVAC system in House A is presumed to be operating at normal

efficiency, and that House A is in the 86th percentile as compared to those other houses.

[0183] **Figure 27b** shows a graph of outside temperature 2708, inside temperature 2710 and HVAC cycle times 2712 in House A for the 24-hour period on date X+1. House A's HVAC system now requires significantly longer cycle times in order to try to maintain the same internal temperature. If those longer cycle times were due to higher outside temperatures, those cycle times would not indicate the existence of any problems. But because server 106 is aware of the outside temperature, the system can eliminate that possibility as an explanation for the higher cycle times.

[0184] Because server 106 is aware of the cycle times in nearby houses, it can determine that, for example, on date X+1 the efficiency of House A is only in the 23rd percentile. The server will be programmed with a series of heuristics, gathered from predictive models and past experience, correlating the drop in efficiency and the time interval over which it has occurred with different possible causes. For example, a 50% drop in efficiency in one day may be correlated with a refrigerant leak, especially if followed by a further drop in efficiency on the following day. A reduction of 10% over three months may be correlated with a clogged filter. Based upon the historical data recorded by the server, the server 106 will be able to alert the homeowner that there is a problem and suggest a possible cause.

[0185] Because the system will be able to calculate effective thermal mass, it will be able to determine the cost effectiveness of strategies such as pre-cooling for specific houses under different conditions. **Figure 28a** shows a graph of outside temperature 2802, inside temperature 2804 and HVAC cycling times 2806 in House A for a specific 24-hour period on date Y assuming that the system has used a pre-cooling strategy to avoid running the air conditioning during the afternoon, when rates are highest. Because House A has high thermal mass, the house is capable of "banking" cooling, and energy consumed during off-peak hours is in effect stored, allowing the house to remain cool even when the system is turned off. Temperatures keep rising during the period the air conditioning is off, but because thermal mass is high, the rate of increase is low, and the house is still comfortable six hours later.

[0186] Although the pre-cooling cycle time in a given home may be relatively long, the homeowner may still benefit if the price per kilowatt during the morning pre-cooling phase is lower than the price during the peak load period. **Figure 28b** shows a graph of the same outside temperature 2802 in House B as in House A in **Figure 28a** for the same 24-hour period and using the same pre-cooling strategy as shown by cycling times 2806. But because House B has minimal thermal mass, using additional electricity in order to pre-cool the house does not have the desired effect; inside temperature 2808 warms up so fast that the cooling that had been banked is quickly lost. Thus the system will recommend that House A pre-cool in order to save money, but not recommend pre-cooling for House B.

[0187] The system can also help compensate for anomalies such as measurement inaccuracies due to factors such as poor thermostat location. It is well known that thermostats should be placed in a location that will be likely to experience “average” temperatures for the overall structure, and should be isolated from windows and other influences that could bias the temperatures they “see.” But for various reasons, not all thermostat installations fit that ideal. **Figure 29a** shows a graph of outside temperature 2902, the actual average inside temperature for the entire house 2904, and inside temperature as read by the thermostat 2906 in House C for a specific 24-hour period on September 15th, assuming that the thermostat is located so that for part of the afternoon on that day the thermostat is in direct sunlight.

[0188] Until the point at which the sun hits the thermostat, the average inside temperature and temperature as read by the thermostat track very closely. But when the direct sunlight hits the thermostat, the thermostat and the surrounding area can heat up, causing the internal temperature as read by the thermostat to diverge significantly from the average temperature for the rest of the house. A conventional thermostat has no way of distinguishing this circumstance from a genuinely hot day, and will both over-cool the rest of the house and waste considerable energy when it cycles the air conditioner in order to reduce the temperature as sensed by the thermostat.

[0189] If the air conditioning is turned off, this phenomenon will manifest as a spike in temperature as measured by the thermostat. If the air conditioning is turned on

(and has sufficient capacity to respond to the distorted temperature signal caused by the sunlight), this phenomenon will likely manifest as relatively small changes in the temperature as sensed by the thermostat, but significantly increased HVAC usage (as well as excessively lowered temperatures in the rest of the house, but this result may not be directly measured in a single sensor environment).

[0190] An embodiment of the system, in contrast, has multiple mechanisms that will allow it to correct for such distortions. First, because an embodiment of the subject system compares the internal readings from House C with the external temperature, it will be obvious that the rise in temperature at 4:00PM is not correlated with a corresponding change in outside temperature. Second, because the system is also monitoring the readings from the thermostat in nearby House D, which (as shown in **Figure 29b**) is exposed to the same outside temperature 602, but has no sudden rise in measured internal afternoon temperature 2908, the system has further validation that the temperature increase is not caused by climatic conditions. And finally, because the system has monitored and recorded the temperature readings from the thermostat in House C for each previous day, and has compared the changing times of the aberration with the progression of the sun, the system can distinguish the patterns likely to indicate solar overheating from other potential causes.

[0191] **Figure 30** illustrates the steps involved in calculating comparative thermal mass, or the thermal mass index. In step 3002, the server retrieves climate data related to home X. Such data may include current outside temperature, outside temperature during the preceding hours, outside humidity, wind direction and speed, whether the sun is obscured by clouds, and other factors. In step 3004, the server retrieves HVAC duty cycle data for home X. Such data may include target settings set by the thermostat in current and previous periods, the timing of switch-on and switch-off events and other data.

[0192] In step 3006, the server retrieves data regarding recent temperature readings as recorded by the thermostat in home X. In step 3008, the server retrieves profile data for home X. Such data may include square footage and number of floors, when the house was built and/or renovated, the extent to which it is insulated, its

address, make, model and age of its furnace and air conditioning hardware, and other data.

[0193] In step 3010, the server retrieves the current inside temperature reading as transmitted by the thermostat. In step 3012, the server calculates the thermal mass index for the home under those conditions; that is, for example, it calculates the likely rate of change for internal temperature in home X from a starting point of 70 degrees when the outside temperature is 85 degrees at 3:00PM on August 10th when the wind is blowing at 5 mph from the north and the sky is cloudy. The server accomplishes this by applying a basic algorithm that weighs each of these external variables as well as variables for various characteristics of the home itself (such as size, level of insulation, method of construction, etc.) and data from other houses and environments.

[0194] **Figure 31** illustrates the steps involved in diagnosing defects in the HVAC system for specific home X. In step 3102, the server retrieves climate data related to home X. Such data may include current outside temperature, outside temperature during the preceding hours, outside humidity, wind direction and speed, whether the sun is obscured by clouds, and other factors. In step 3104, the server retrieves HVAC duty cycle data for home X. Such data may include target settings set by the thermostat in current and previous periods, the timing of switch-on and switch-off events and other data.

[0195] In step 3106, the server retrieves data regarding current and recent temperature readings as recorded by the thermostat in home X. In step 3108, the server retrieves profile data for home X. Such data may include square footage and number of floors, when the house was built and/or renovated, the extent to which it is insulated, its address, make, model and age of its furnace and air conditioning hardware, and other data. In step 3110, the server retrieves comparative data from other houses that have thermostats that also report to the server.

[0196] Such data may include interior temperature readings, outside temperature for those specific locations, duty cycle data for the HVAC systems at those locations, profile data for the structures and HVAC systems in those houses and the calculated thermal mass index for those other houses. In step 3112, the server

calculates the current relative efficiency of home X as compared to other homes. Those comparisons will take into account differences in size, location, age, etc in making those comparisons.

[0197] The server will also take into account that comparative efficiency is not absolute, but will vary depending on conditions. For example, a house that has extensive south-facing windows is likely to experience significant solar gain. On sunny winter days, that home will appear more efficient than on cloudy winter days. That same house will appear more efficient at times of day and year when trees or overhangs shade those windows than it will when summer sun reaches those windows. Thus the server will calculate efficiency under varying conditions.

[0198] In step 3114 the server compares the HVAC system's efficiency, corrected for the relevant conditions, to its efficiency in the past. If the current efficiency is substantially the same as the historical efficiency, the server concludes 3116 that there is no defect and the diagnostic routine ends. If the efficiency has changed, the server proceeds to compare the historical and current data against patterns of changes known to indicate specific problems. For example, in step 3118, the server compares that pattern of efficiency changes against the known pattern for a clogged air filter, which is likely to show a slow, gradual degradation over a period of weeks or even months.

[0199] If the pattern of degradation matches the clogged filter paradigm, the server creates and transmits to the homeowner a message 3120 alerting the homeowner to the possible problem. If the problem does not match the clogged filter paradigm, the system compares 3122 the pattern to the known pattern for a refrigerant leak, which is likely to show a degradation over a period of a few hours to a few days. If the pattern of degradation matches the refrigerant leak paradigm, the server creates and transmits to the homeowner a message 3124 alerting the homeowner to the possible problem.

[0200] If the problem does not match the refrigerant leak paradigm, the system compares 3126 the pattern to the known pattern for an open window or door, which is likely to show significant changes for relatively short periods at intervals uncorrelated with climatic patterns. If the pattern of degradation matches the open

door/window paradigm, the server creates and transmits to the homeowner a message 3128 alerting the homeowner to the possible problem. If the problem does not match the refrigerant leak paradigm, the system continues to step through remaining known patterns N 3130 until either a pattern is matched 3132 or the list has been exhausted without a match 3134.

[0201] **Figure 32** illustrates the steps involved in diagnosing inaccurate thermostat readings due to improper location. In step 3202, the server retrieves climate data related to home X. Such data may include current outside temperature, outside temperature during the preceding hours, outside humidity, wind direction and speed, whether the sun is obscured by clouds, and other factors. In step 3204, the server retrieves HVAC duty cycle data for home X. Such data may include target settings set by the thermostat in current and previous periods, the timing of switch-on and switch-off events and other data.

[0202] In step 3206, the server retrieves data regarding current and recent temperature readings as recorded by the thermostat in home X. In step 3208, the server retrieves profile data for home X. Such data may include square footage and number of floors, when the house was built and/or renovated, the extent to which it is insulated, its address, make, model and age of its furnace and air conditioning hardware, and other data.

[0203] In step 3210, the server retrieves comparative data from other houses that have thermostats that also report to the server. Such data may include interior temperature readings, outside temperature for those specific locations, duty cycle data for the HVAC systems at those locations, profile data for the structures and HVAC systems in those houses and the calculated thermal mass index for those other houses.

[0204] In step 3212, the server calculates the expected thermostat temperature reading based upon the input data. In step 3214, the server compares the predicted and actual values. If the calculated and actual values are at least roughly equivalent, the server concludes 3216 that there is no thermostat-related anomaly. If the calculated and actual values are not roughly equivalent, the server retrieves additional historical information about past thermostat readings in step 3218.

[0205] In step 3220, the server retrieves solar progression data, i.e., information regarding the times at which the sun rises and sets on the days being evaluated at the location of the house being evaluated, and the angle of the sun at that latitude, etc. In step 3222, the server compares the characteristics of the anomalies over time, to see if, for example, abnormally high readings began at 3:06 on June 5th, 3:09 on June 6th, 3:12 on June 7th, and the solar progression data suggests that at the house being analyzed, that sun would be likely to reach a given place in that house three minutes later on each of those days.

[0206] If the thermostat readings do not correlate with the solar progression data, the server concludes 3224 that the sun is not causing the distortion by directly hitting the thermostat. If the thermostat readings do correlate with solar progression, the server then calculates 3226 the predicted duration of the distortion caused by the sun.

[0207] In step 3228, the server calculates the appropriate setpoint information to be used by the thermostat to maintain the desired temperature and correct for the distortion for the expected length of the event. For example, if the uncorrected setpoint during the predicted event is 72 degrees, and the sun is expected to elevate the temperature reading by eight degrees, the server will instruct the thermostat to maintain a setpoint of 80 degrees. In step 3230, the server sends the homeowner a message describing the problem.

[0208] One or more embodiments of the invention may be used to implement additional energy savings by implementing small, repeated changes in setpoint. Because energy consumption is directly proportional to setpoint – that is, the further a given setpoint diverges from the balance point (the natural inside temperature assuming no HVAC activity) in a given house under given conditions, the higher energy consumption will be to maintain temperature at that setpoint), energy will be saved by any strategy that over a given time frame lowers the average heating setpoint or raises the cooling setpoint.

[0209] It is therefore possible to save energy by adopting a strategy that takes advantage of human insensitivity to slow temperature ramping by incorporating a user's desired setpoint within the range of the ramp, but setting the average target

temperature below the desired setpoint in the case of heating, and above it in the case of cooling. For example, a ramped summer setpoint that consisted of a repeated pattern of three phases of equal length set at 72°F, 73°F, and 74°F would create an effective average setpoint of 73°F, but would generally be experienced by occupants as yielding at least roughly equivalent comfort as in a room set at a constant 72°F. Energy savings resulting from this approach have been shown to be in the range of 4-6%.

[0210] Embodiments of the invention can automatically generate optimized ramped setpoints that could save energy without compromising the comfort of the occupants. It would also be advantageous to create a temperature control system that could incorporate adaptive algorithms that could automatically determine when the ramped setpoints should not be applied due to a variety of exogenous conditions that make application of such ramped setpoints undesirable.

[0211] **Figure 33** represents the conventional programming of a thermostat and the resulting behavior of a home's HVAC system in the air conditioning context. The morning setpoint 3302 of 74 degrees remains constant from midnight until 9:00AM, and the inside temperature 3304 varies more or less within the limits of the hysteresis band during that entire period. When the setpoint changes to 80 degrees 3306, the inside temperature 3308 varies within the hysteresis band around the new setpoint, and so on. Whether the average temperature is equal to, greater or less than the nominal setpoint will depend on weather conditions, the dynamic signature of the structure, and the efficiency and size of the HVAC system. But in most cases the average temperature will be at least roughly equivalent to the nominal setpoint.

[0212] **Figure 34** represents implementation of a three-phase ramped setpoint derived from the same user preferences as manifested by the settings shown in **Figure 33**. Thus the user-selected setpoint for the morning is still 74 degrees, and is reflected in the setpoint 3404 at the start of each three-step cycle, but because (in the air conditioning context) the setpoint requested by the user is the lowest of the three discrete steps, rather than the middle step, the average setpoint will be one degree higher 3402, and the resulting average inside temperature will be roughly one degree warmer than the average temperature without use of the ramped setpoints, thereby saving energy.

[0213] In the currently preferred embodiment, the implementation of the ramped setpoints may be dynamic based upon both conditions inside the structure and other planned setpoint changes. Thus, for example, the ramped setpoints 3406, 3408 and 3410 may be timed so that the 9AM change in user-determined setpoint from 74 degrees to 80 degrees is in effect anticipated, and the period in which the air conditioner is not used can be extended prior to the scheduled start time for the less energy-intensive setpoint. Similarly, because the server 106 is aware that a lower setpoint will begin at 5PM. The timing can be adjusted to avoid excessively warm temperatures immediately prior to the scheduled setpoint change, which could cause noticeable discomfort relative to the new setpoint if the air conditioner is incapable of quickly reducing inside temperature on a given day based upon the expected slope of inside temperatures at that time 3412.

[0214] In order to implement such ramped setpoints automatically, algorithms may be created. These algorithms may be generated and/or executed as instructions on remote server 106 and the resulting setpoint changes can be transmitted to a given thermostat on a just-in-time basis or, if the thermostat 108 is capable of storing future settings, they may be transferred in batch mode to such thermostats. Basic parameters used to generate such algorithms include:

[0215] the number of discrete phases to be used;

[0216] the temperature differential associated with each phase; and

[0217] the duration of each phase

[0218] In order to increase user comfort and thus maximize consumer acceptance, additional parameters may be considered, including:

[0219] time of day

[0220] outside weather conditions

[0221] recent history of manual inputs

[0222] recent pre-programmed setpoint changes.

[0223] Time of day may be relevant because, for example, if the home is typically unoccupied at a given time, there is no need for perceptual programming. Outside weather is relevant because comfort is dependent not just on temperature as sensed by a thermostat, but also includes radiant differentials. On extremely cold days,

even if the inside dry-bulb temperature is within normal comfort range, radiant losses due to cold surfaces such as single-glazed windows can cause subjective discomfort; thus on such days occupants may be more sensitive to ramping. Recent manual inputs (e.g., programming overrides) may create situations in which exceptions should be taken; depending on the context, recent manual inputs may either suspend the ramping of setpoints or simply alter the baseline temperature from which the ramping takes place.

[0224] **Figure 35** shows the steps used in the core ramped setpoint algorithm in the context of a remotely managed thermostat system. In step 3502 the application determines whether to instantiate the algorithm based upon external scheduling criteria. In step 3504 the application running on a remote server retrieves from the thermostat the data generated by or entered into the thermostat, including current temperature settings, HVAC status and inside temperature. The algorithm performs preliminary logical tests at that point to determine whether further processing is required. For example, in the heating context, if the inside temperature as reported by the thermostat 108 is more than 1 degree higher than the current setpoint, the algorithm may determine that running the ramped setpoint program will have no effect and therefore terminate.

[0225] In step 3506 the algorithm advances to the next phase from the most recent phase; i.e., if the algorithm is just starting, the phase changes from “0” to “1”; if it has just completed the third phase of a three-phase ramp, the phase will change from “2” to “0”. In step 3508 the application determines if the current phase is “0”. If it is, then in step 3510 the algorithm determines whether current setpoint equals the setpoint in the previous phase. If so, which implies no manual overrides or other setpoint adjustments have occurred during the most recent phase, then in step 3512 the algorithm sets the new setpoint back to the previous phase “0” setpoint. If not, then in step 3514, the algorithm keeps the current temperature setting as setpoint for this new phase. In step 3516, the algorithm logs the resulting new setpoint as the new phase “0” setpoint for use in subsequent phases.

[0226] Returning to the branch after step 3508, if the current phase at that point is not phase “0”, then in step 3520, the algorithm determines whether the current

setpoint is equal to the setpoint temperature in the previous phase. If not, which implies setpoints have been adjusted by the house occupants, thermostat schedules, or other events, then in step 3522, the application resets the phase to “0”, resets the new setpoint associated with phase “0” to equal the current temperature setting, and sets the current setting to that temperature. Alternatively, if the current temperature setting as determined in step 3520 is equal to the setpoint in the previous phase, then in step 3524 new setpoint is made to equal current setpoint plus the differential associated with each phase change. In step 3526 the “previous-phase setpoint” variable is reset to equal the new setpoint in anticipation of its use during a subsequent iteration.

[0227] **Figure 36** shows one embodiment of the overall control application implementing the algorithm described in **Figure 35**. In step 3602, the control application retrieves the current setting from the thermostat. In step 3604, the setting is logged in database 300. In step 3606, the control program determines whether other algorithms that have higher precedence than the ramped setpoint algorithm are to be run. If another algorithm is to be run prior to the ramped setpoint algorithm, then the other program is executed in step 3608. If there are no alternate algorithms that should precede the ramped setpoint application then in step 1310, the control program determines whether the thermostat has been assigned to execute the ramped setpoint program. If not, the control program skips the remaining actions in the current iteration. If the program is set to run, then in step 3612 the algorithm retrieves from database 300 the rules and parameters governing the implementation of the algorithm for the current application of the program.

[0228] In step 3614, the algorithm determines whether one or more conditions that preclude application of the algorithm, such as extreme outside weather conditions, whether the home is likely to be occupied, etc. If any of the exclusionary conditions apply, the application skips execution of the ramped setpoint algorithm for the current iteration. If not, the application proceeds to step 3616 in which the application determines whether the setpoint has been altered by manual overrides, thermostat setback schedule changes, or other algorithms as compared to the previous value as stored in database 300. If setpoint has been altered, the application proceeds to step 3620 discussed below.

[0229] In step 3618, the program described in **Figure 35** is executed. In step 3620, the application resets the phase to "0". Certain temperature setting variables are reset in anticipation of their use in subsequent phases. These variables include the new phase 0 temperature setting which is anchored to the current actual temperature setting, and the new previous-phase setpoint which will be used for identifying setpoint overrides in the subsequent phase.

[0230] In step 3622, the system records the changes to the thermostat settings to database 300. In step 3624, the system records the changes to the phase status of the algorithm to database 300. In step 3626, the application determines whether the new temperature setting differs from the current setting. If they are the same, the application skips applying changes to the thermostat. If they are different, then in step 3628, the application transmits revised settings to the thermostat. In step 3630, the application then hibernates for the specified duration until it is invoked again by beginning at step 3602 again.

[0231] An embodiment of the subject invention may also be used to detect occupancy through the use of software related to electronic devices located inside the conditioned structure, such as the browser running on computer or other device 104. **Figure 37** represents the screen of a computer or other device 104 using a graphical user interface connected to the Internet. The screen shows that a browser 3700 is displayed on computer 104. In one embodiment, a background application installed on computer 104 detects activity by a user of the computer, such as cursor movement, keystrokes or otherwise, and signals the application running on server 106 that activity has been detected. Server 106 may then, depending on context, (a) transmit a signal to thermostat 108 changing setpoint because occupancy has been detected at a time when the system did not expect occupancy; (b) signal the background application running on computer 104 to trigger a software routine that instantiates a pop-up window 3702 that asks the user if the server should change the current setpoint, alter the overall programming of the system based upon a new occupancy pattern, etc. The user can respond by clicking the cursor on "yes" button 3704 or "No" button 3706. Equivalent means of signalling activity may be employed with interactive television programming, gaming systems, etc.

[0232] **Figure 38** is a flowchart showing the steps involved in the operation of one embodiment of the subject invention. In step 3802, computer 104 transmits a message to server 106 via the Internet indicating that there is user activity on computer 104. This activity can be in the form of keystrokes, cursor movement, input via a television remote control, etc. In step 3804 the application queries database 300 to retrieve setting information for the HVAC system. In step 3806 the application determines whether the current HVAC program is intended to apply when the home is occupied or unoccupied.

[0233] If the HVAC settings then in effect are intended to apply for an occupied home, then the application terminates for a specified interval. If the HVAC settings then in effect are intended to apply when the home is unoccupied, then in step 3808 the application will retrieve from database 300 the user's specific preferences for how to handle this situation. If the user has previously specified (at the time that the program was initially set up or subsequently modified) that the user prefers that the system automatically change settings under such circumstances, the application then proceeds to step 3816, in which it changes the programmed setpoint for the thermostat to the setting intended for the house when occupied. If the user has previously specified that the application should not make such changes without further user input, then in step 3810 the application transmits a command to computer 104 directing the browser to display a message informing the user that the current setting assumes an unoccupied house and asking the user in step 3812 to choose whether to either keep the current settings or revert to the pre-selected setting for an occupied home. If the user selects to retain the current setting, then in step 3814 the application will write to database 300 the fact that the users has so elected and terminate. If the user elects to change the setting, then in step 3816 the application transmits the revised setpoint to the thermostat. In step 3814 the application writes the updated setting information to database 300.

[0234] **Figure 39** is a flowchart that shows how an embodiment of the invention can be used to select different HVAC settings based upon its ability to identify which of multiple potential occupants is using the computer attached to the system. In step 3902 computer 104 transmits to server 106 information regarding the type of

activity detected on computer 104. Such information could include the specific program or channel being watched if, for example, computer 104 is used to watch television. The information matching, for example, TV channel 7 at 4:00 PM on a given date to specific content may be made by referring to Internet-based or other widely available scheduling sources for such content. In step 3904 server 106 retrieves from database 300 previously logged data regarding viewed programs. In step 3906 server 106 retrieves previously stored data regarding the residents of the house.

[0235] For example, upon initiating the service, one or more users may have filled out online questionnaires sharing their age, gender, schedules, viewing preferences, etc. In step 3908, server 106 compares the received information about user activity to previously stored information retrieved from database 300 about the occupants and their viewing preferences. For example, if computer 104 indicates to server 106 that the computer is being used to watch golf, the server may conclude that an adult male is watching; if computer 104 indicates that it is being used to watch children's programming, server 106 may conclude that a child is watching.

[0236] In step 3910 the server transmits a query to the user in order to verify the match, asking, in effect, "Is that you Bob?" In step 3912, based upon the user's response, the application determines whether the correct user has been identified. If the answer is no, then the application proceeds to step 3916. If the answer is yes, then in step 3914 the application retrieves the temperature settings for the identified occupant. In step 3916 the application writes to database 300 the programming information and information regarding matching of users to that programming.

[0237] In an alternative embodiment, the application running on computer 104 may respond to general user inputs (that is, inputs not specifically intended to instantiate communication with the remote server) by querying the user whether a given action should be taken. For example, in a system in which the computer 104 is a web-enabled television or web-enabled set-top device connected to a television as a display, software running on computer 104 detects user activity, and transmits a message indicating such activity to server 106. The trigger for this signal may be general, such as changing channels or adjusting volume with the remote control or a power-on event. Upon receipt by server 106 of this trigger, server 106 transmits instructions to computer

104 causing it to display a dialog box asking the user whether the user wishes to change HVAC settings.

[0238] Additional functionality is also envisioned as part of different embodiments of the invention. For example, information from historic data may be used to predict how long it will take a user to reach home from the current coordinates, and the estimated arrival time may be used to calculate optimal cycling strategies for the HVAC system. In addition, information about traffic conditions may be integrated into these calculations, so that the geospatial data relative to mobile device 105 may indicate that a user is taking his or her normal route, but because of a traffic jam, is likely to come home later than would otherwise be expected. The characteristics of a given location may be used to infer arrival times as well. For example, if the geospatial data indicates that the user of mobile device 105 has arrived at the supermarket on his way home, a delay of 20 minutes is likely, whereas if the user has parked at a restaurant, the delay is likely to be one hour.

[0239] It is also possible to incorporate more sophisticated heuristics in incorporating the varying preferences of multiple occupants of a given home or other structure. For example, rules can be structured so that User #1's preferences control during the heating season, but not during the cooling season; User #2's preferences might control during certain times of the day but not others; User #3's preferences may take precedence whenever they result in a more energy efficient strategy, but not when they result in increased energy use, and so on.

[0240] While particular embodiments of the present invention have been shown and described, it is apparent that changes and modifications may be made without departing from the invention in its broader aspects, and, therefore, that the invention may be carried out in other ways without departing from the true spirit and scope. These and other equivalents are intended to be covered by the following claims:

WHAT IS CLAIMED IS:

1. A method for varying temperature setpoints for an HVAC system comprising:

accessing stored data comprising a plurality of internal temperature measurements taken within a structure and a plurality of outside temperature measurements relating to temperatures outside the structure;

using the stored data to predict a temperature inside the structure in response to at least changes in the outside temperatures;

determining with one or more computer processors, the geographic location of a mobile electronic device that is connected to a network;

associating said mobile electronic device to a structure having a known geographic location that contains one or more networked climate control devices;

determining with one or more computer processors, whether the location of said mobile electronic device indicates occupancy of said structure by a person associated with said mobile electronic device;

using route data to determine whether a user of the mobile electronic device is traveling to said structure;

using traffic data to predict a length of time for a user of said mobile device to reach said structure; and

adjusting with one or more computer processors, the temperature setpoint on said controller for an HVAC system for said structure based upon said predicted length of time for a user of the mobile device to reach said structure, said predicted temperature inside said structure, and whether or not said structure is deemed to be occupied.

**SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO
OPTIMIZE AN ENERGY MANAGEMENT SYSTEM**

ABSTRACT OF THE DISCLOSURE

Embodiments of the invention comprise systems and methods for using the geographic location of networked consumer electronics devices as indications of occupancy of a structure for purposes of automatically adjusting the temperature setpoint on a thermostatic HVAC control. At least one thermostat is located inside a structure and is used to control an HVAC system in the structure. At least one mobile electronic device is used to indicate the state of occupancy of the structure. The state of occupancy is used to alter the setpoint on the thermostatic HVAC control to reduce unneeded conditioning of unoccupied spaces.

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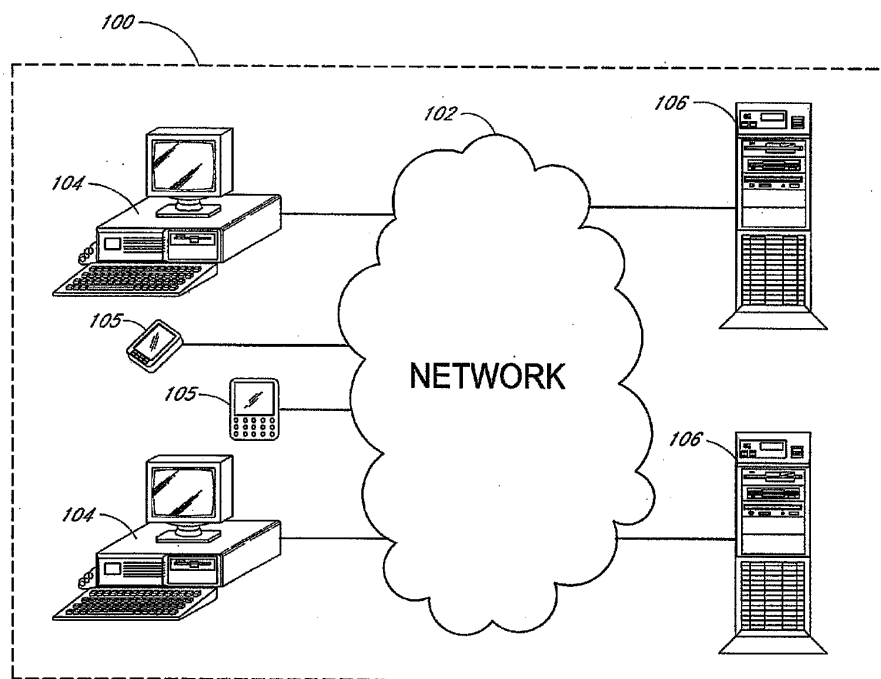
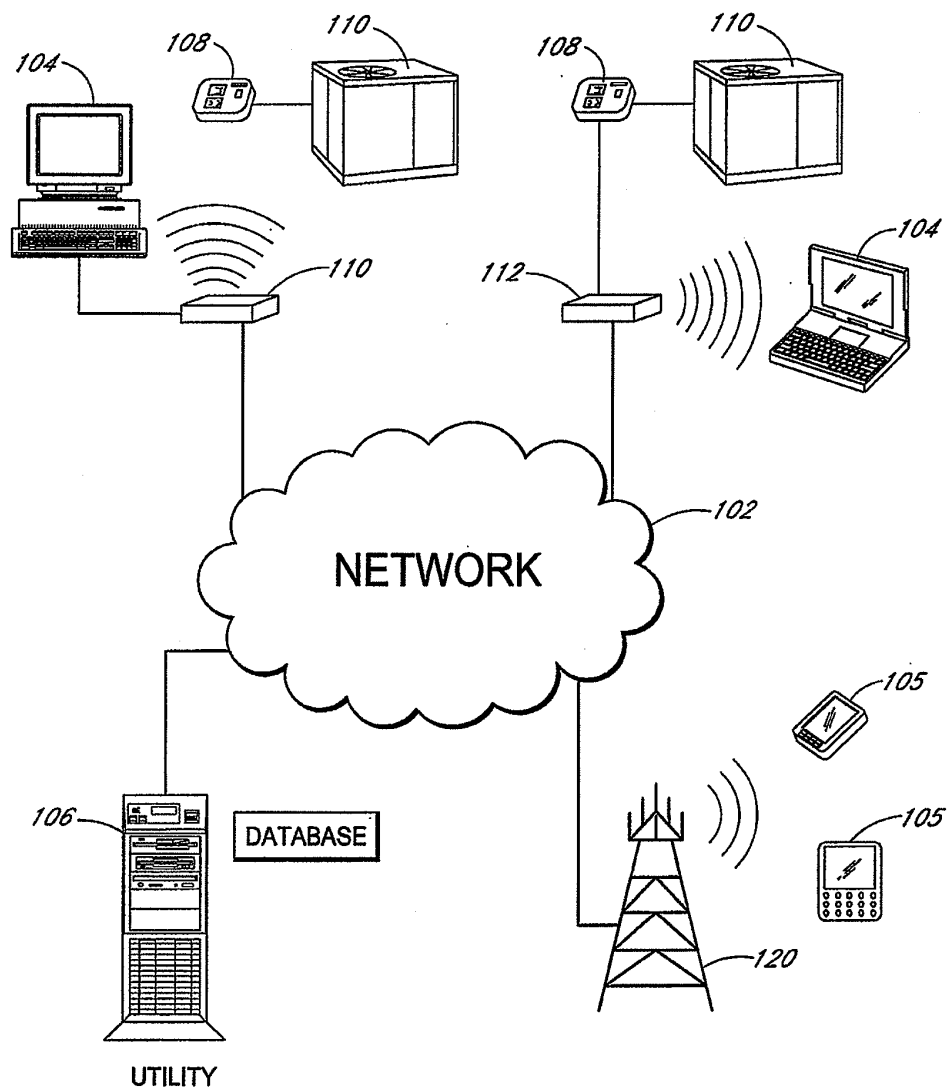


FIG. 1

*FIG. 2*

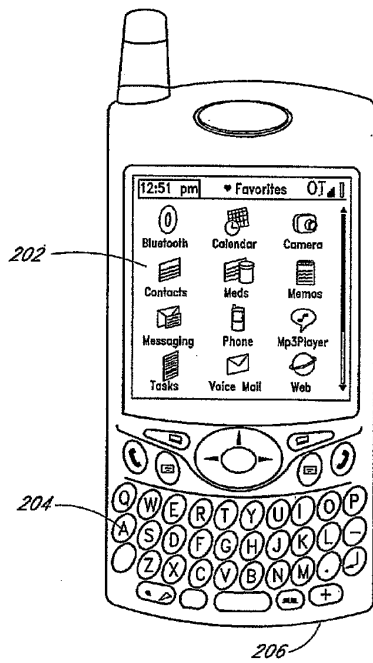


FIG. 3A

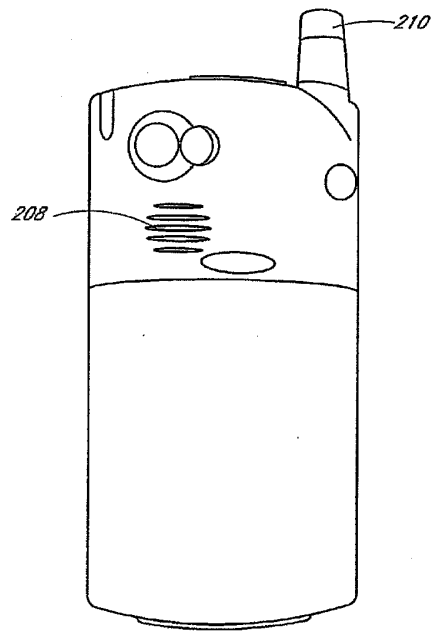


FIG. 3B

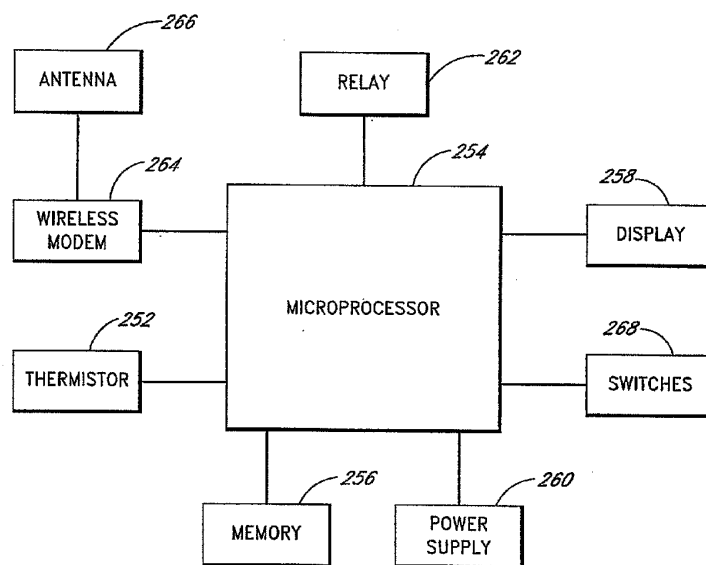


FIG. 4

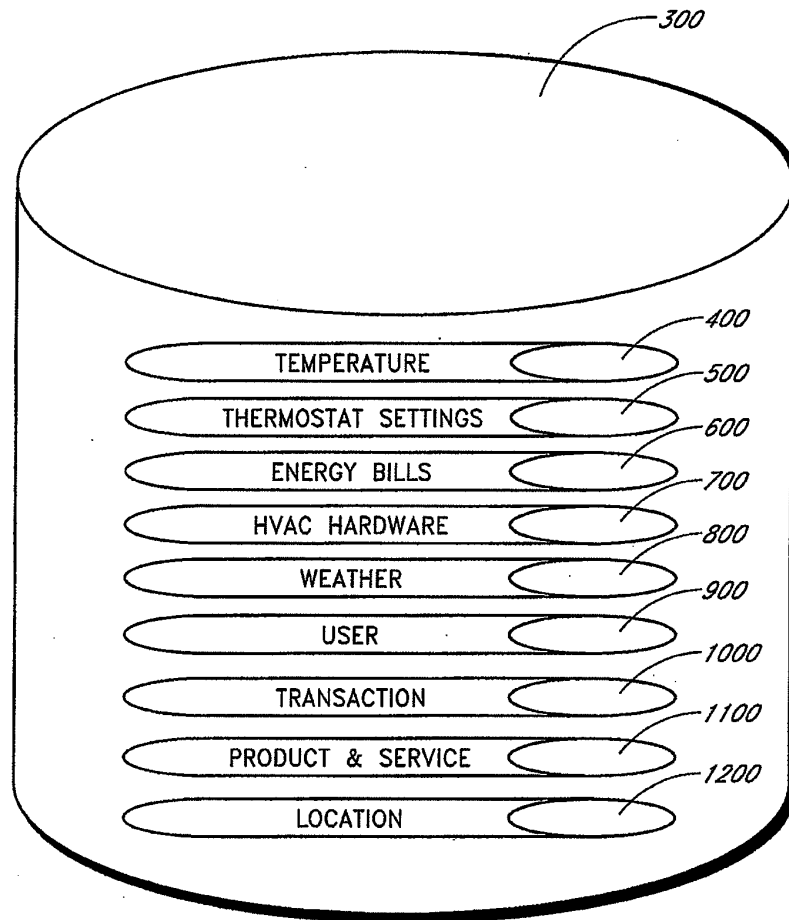
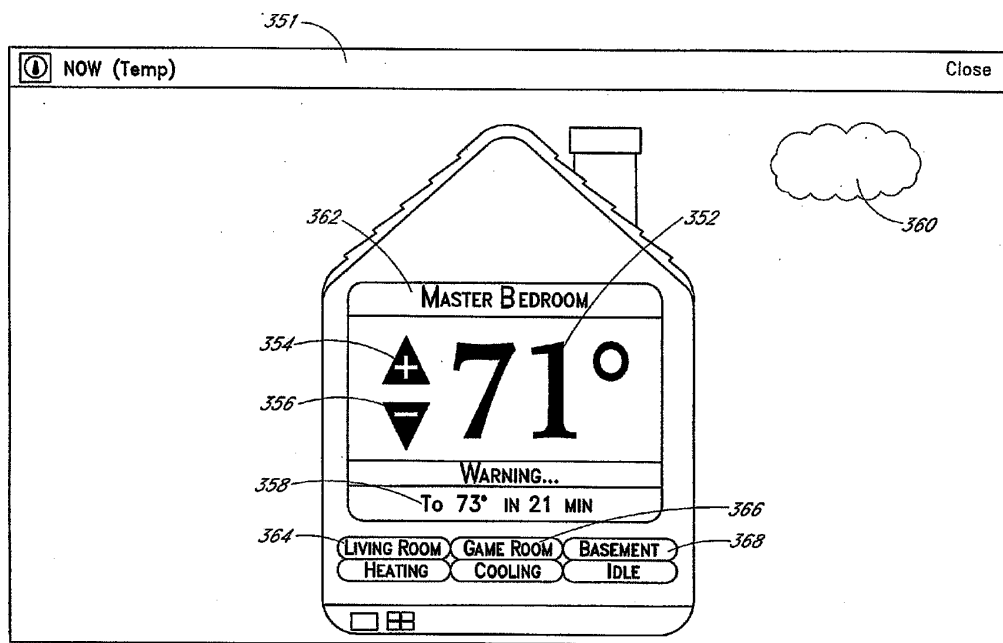


FIG. 5



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FIG. 6A

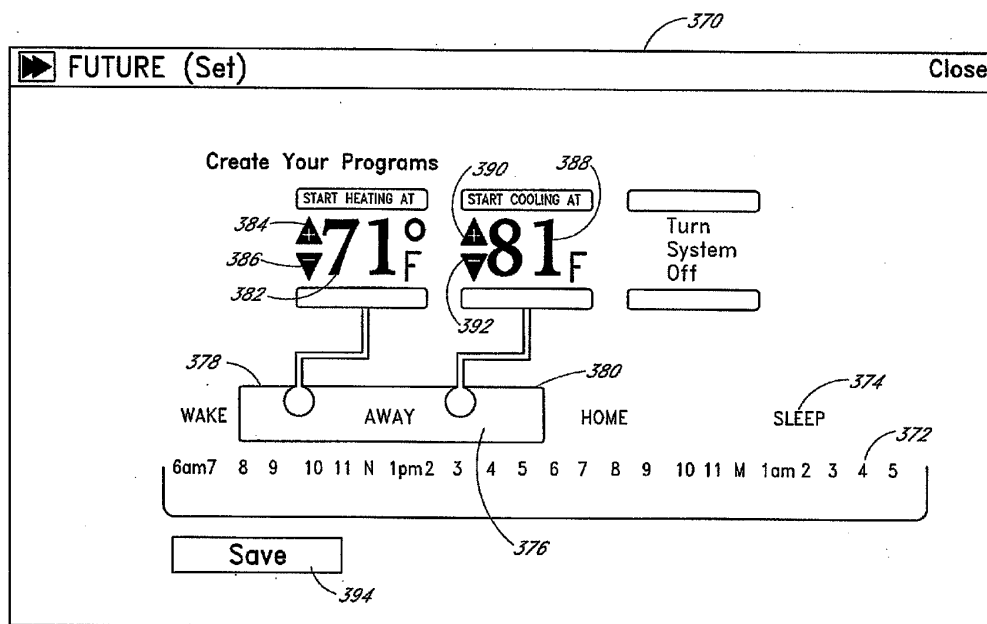


FIG. 6B

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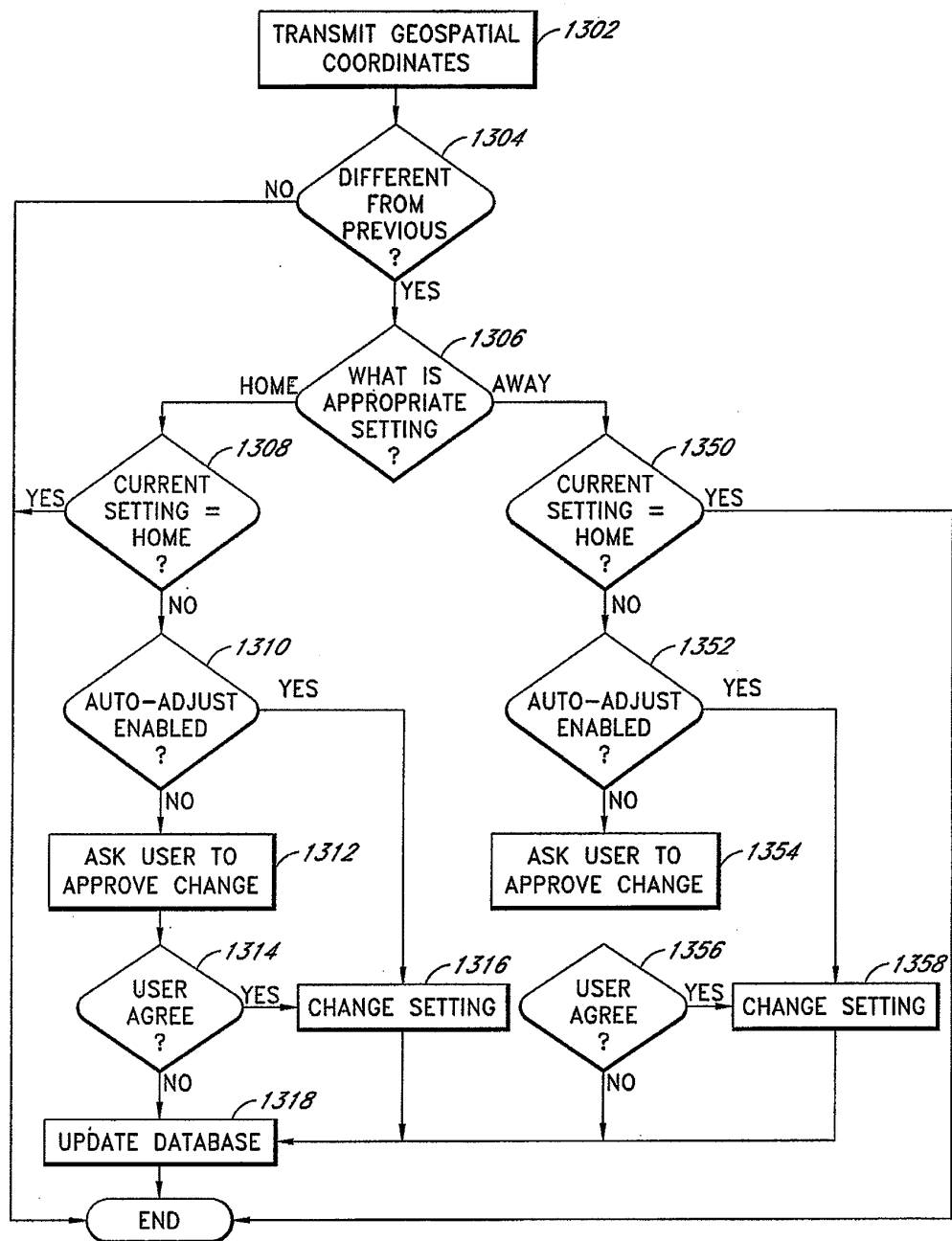


FIG. 7

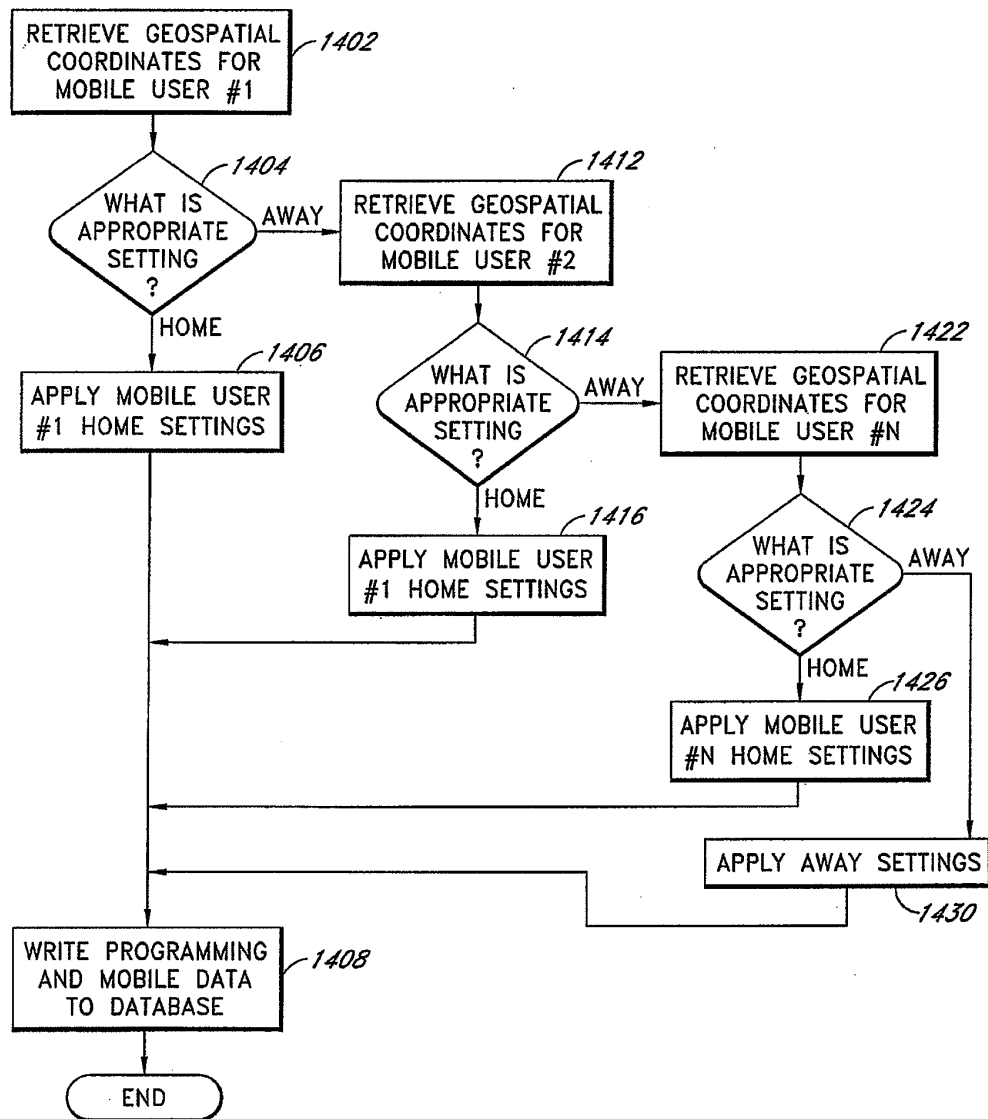


FIG. 8

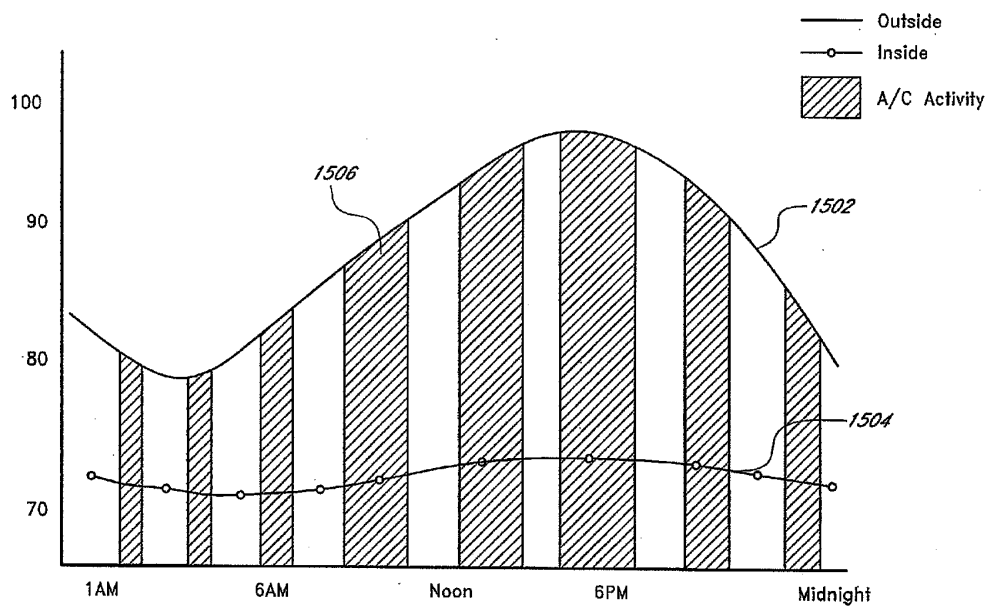


FIG. 9A

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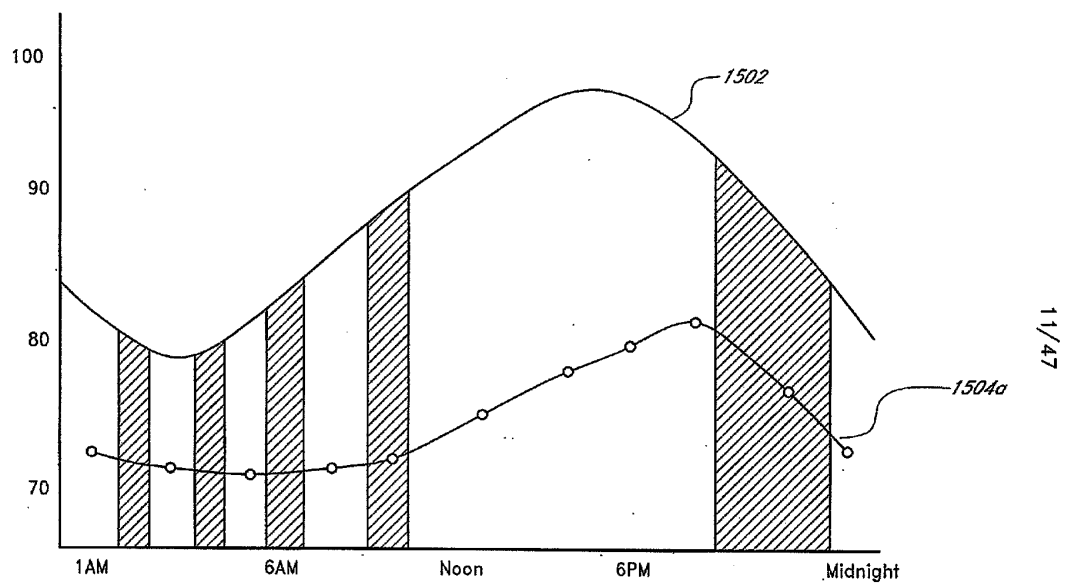
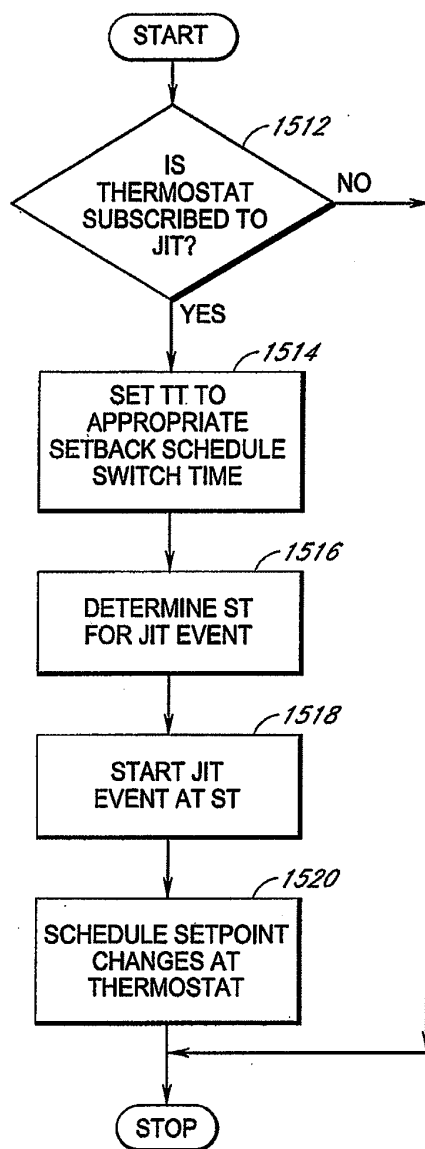


FIG. 9B

*FIG. 10*

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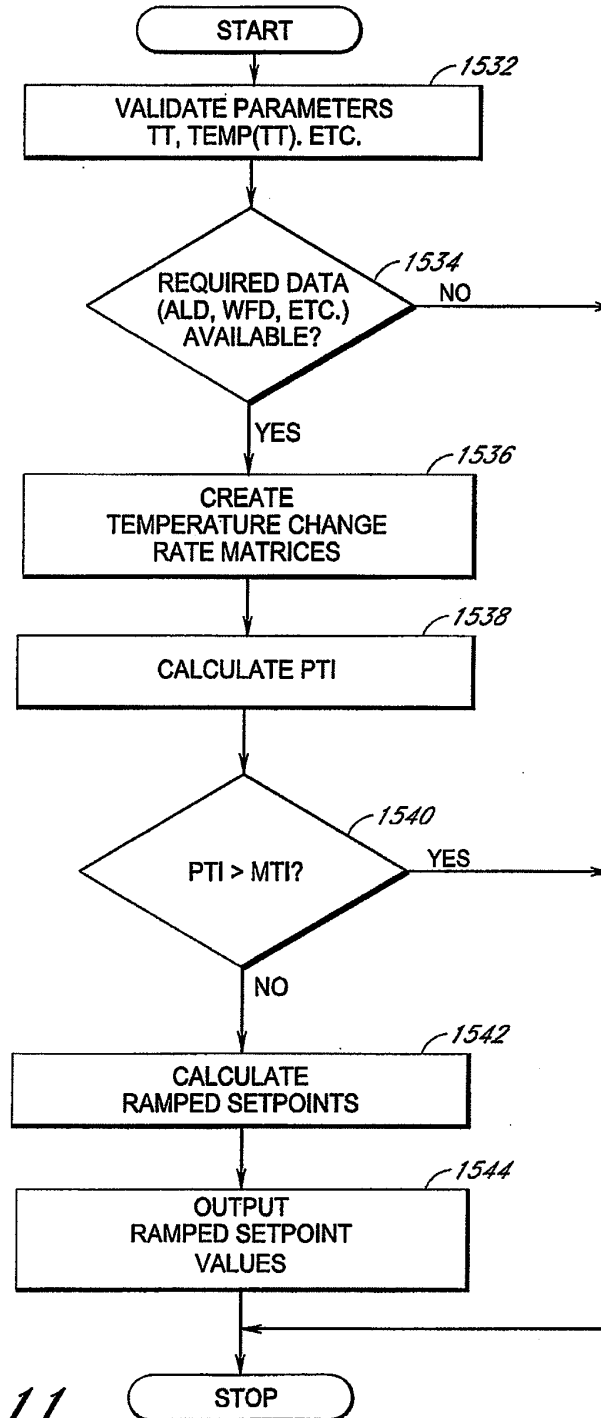


FIG. 11

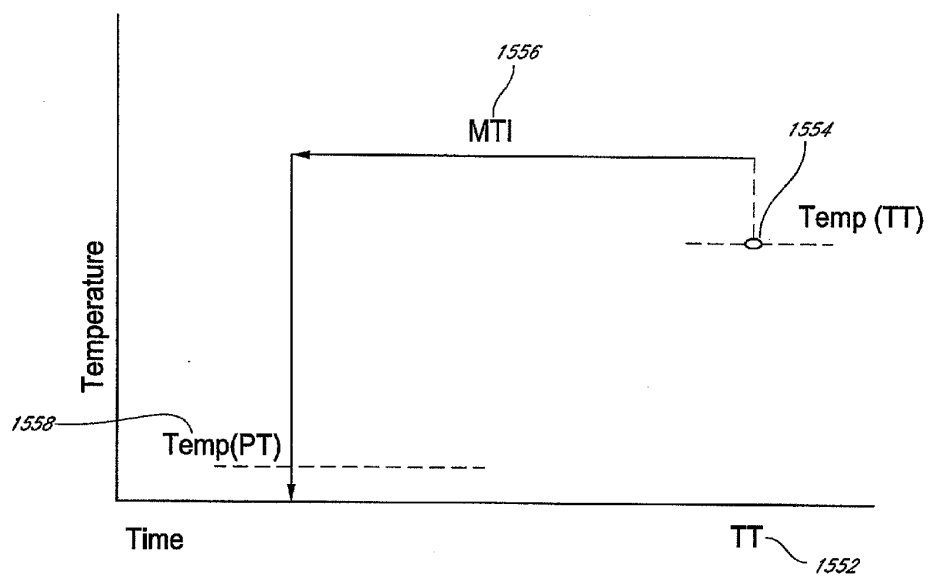


FIG. 12A

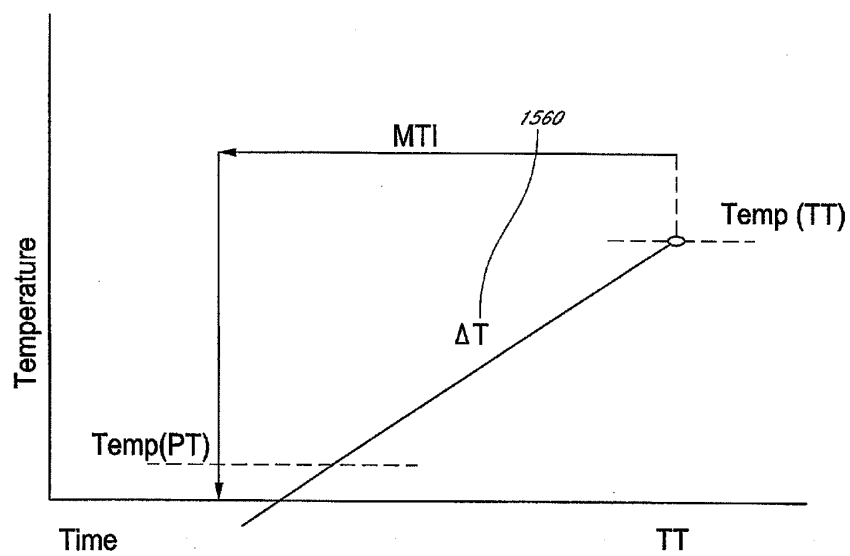


FIG. 12B

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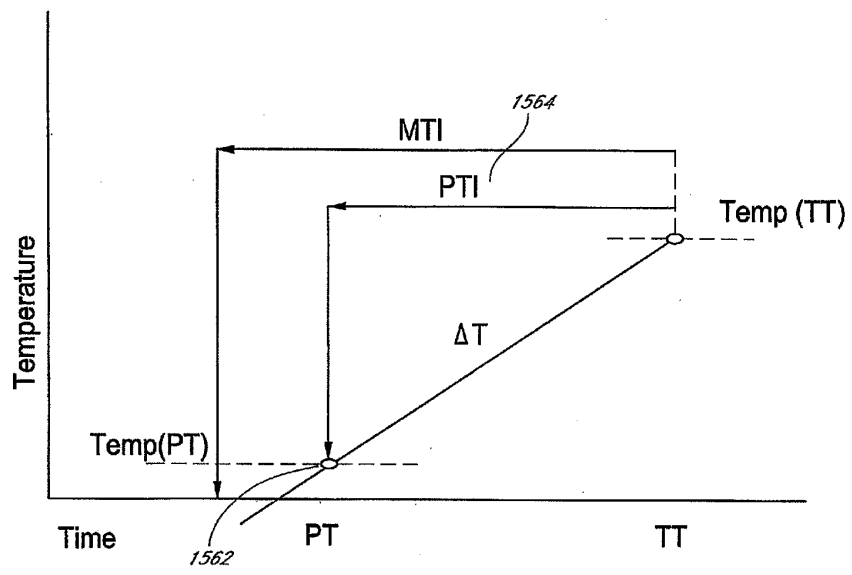
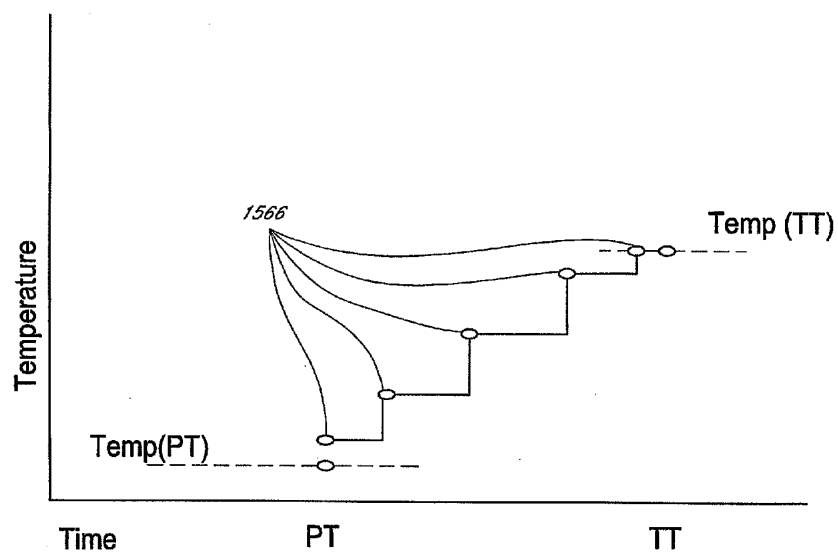


FIG. 12C

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FIG. 12D

FIG. 13

Time (hh:mm)	Temperature		Outside Conditions					Inside Conditions							
	Inside Temp.	Outside Temp.	Conditions	Humidity	Pressure	Wind Speed	Wind Direction	Cool Setting	Heat Setting	Hold Mode	Schd Setting	Schd Cool	Schd Heat	Hvac State	Hvac Mode
2009/04/10 11:00	69.70	54.00	Mostly Cloudy	74%	29.89in/ 1012.1hPa Steady	1.0mph 1.6kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:01	69.69	54.10	Overcast	74%	29.89in/ 1012.1hPa Rising	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:02	69.60	54.10	Overcast	74%	29.89in/ 1012.1hPa Steady	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:03	69.70	54.10	Overcast	74%	29.89in/ 1012.1hPa Rising	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:04	69.70	54.10	Overcast	74%	29.89in/ 1012.1hPa Steady	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:05	69.70	54.10	Overcast	74%	29.89in/ 1012.1hPa Rising	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:06	69.80	54.70	Overcast	72%	29.89in/ 1012.1hPa Steady	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:07	69.80	54.70	Overcast	72%	29.89in/ 1012.1hPa Rising	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:08	70.00	54.70	Overcast	72%	29.89in/ 1012.1hPa Steady	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:09	70.00	54.70	Overcast	72%	29.89in/ 1012.1hPa Rising	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat
2009/04/10 11:10	70.00	54.70	Overcast	72%	29.89in/ 1012.1hPa Steady	2.0mph 3.2kph	SE	80.00	71.00	Off	Out/Day	80.00	65.00	Heat	Heat

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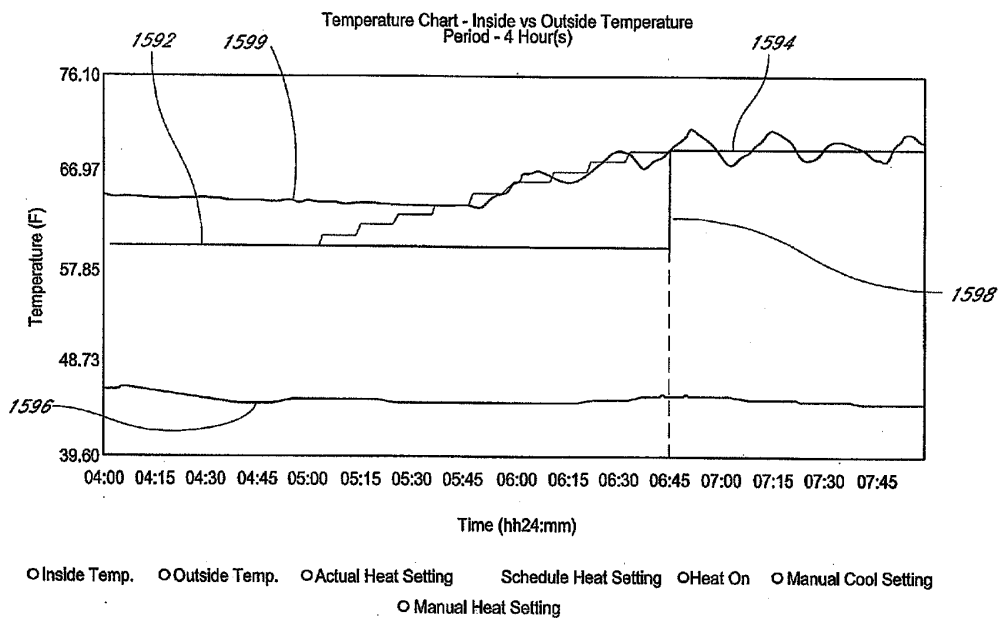


FIG. 14

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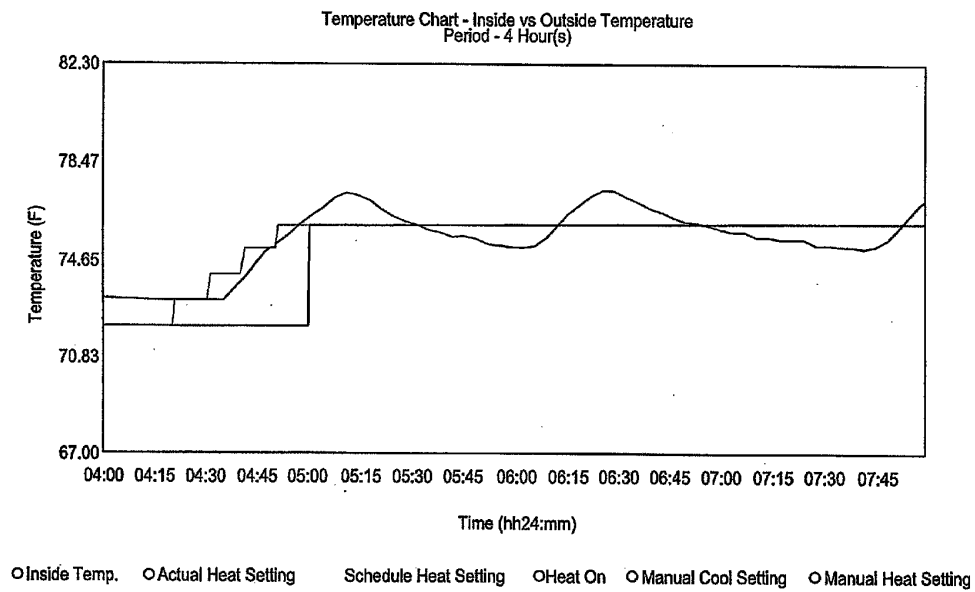


FIG. 15

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FIG. 16-1

FIG. 16-2

FIG. 16

1602

1604

FIG. 16-1

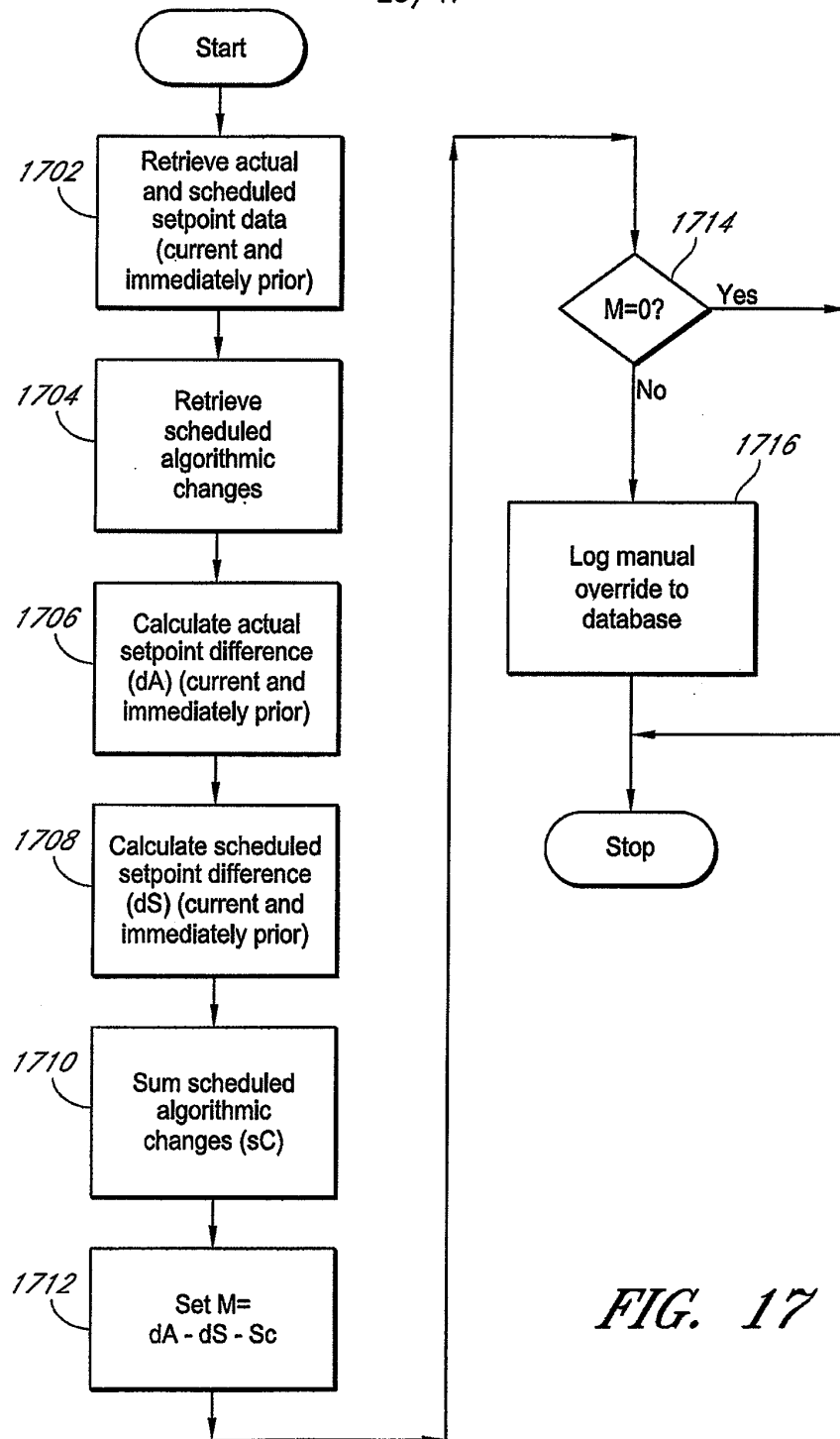
Outside/Inside Difference, Degrees F	Predicted Inside Temp Change, Degrees F/hour	Outside/Inside Difference, Degrees F	Predicted Inside Temp Change, Degrees F/hour	Outside/Inside Difference, Degrees F	Predicted Inside Temp Change, Degrees F/hour	Outside/Inside Difference, Degrees F	Predicted Inside Temp Change, Degrees F/hour
-99	-1.20945425	-49	0.61355475	1	2.43656376	51	4.25957277
-98	-1.17299407	-48	0.65001493	2	2.47302394	52	4.29603285
-97	-1.13653389	-47	0.68647511	3	2.50948412	53	4.33249313
-96	-1.10007371	-46	0.72293529	4	2.5459443	54	4.36895331
-95	-1.06361353	-45	0.75939547	5	2.58240448	55	4.40541349
-94	-1.02715335	-44	0.79585565	6	2.61886466	56	4.44187367
-93	-0.99069317	-43	0.83231583	7	2.65532484	57	4.47833385
-92	-0.95423299	-42	0.86877602	8	2.69178502	58	4.51479403
-91	-0.91777281	-41	0.9052362	9	2.7282452	59	4.55125421
-90	-0.88131263	-40	0.94169638	10	2.76470538	60	4.58771439
-89	-0.84485245	-39	0.97815656	11	2.80116556	61	4.62417457
-88	-0.80839227	-38	1.01461674	12	2.83762574	62	4.66063475
-87	-0.77193209	-37	1.05107692	13	2.87408592	63	4.69709493
-86	-0.73547191	-36	1.0875371	14	2.9105461	64	4.73355511
-85	-0.69901173	-35	1.12399728	15	2.94700628	65	4.77001529
-84	-0.66255155	-34	1.16045746	16	2.98346646	66	4.80647547
-83	-0.62609137	-33	1.19691764	17	3.01992664	67	4.84293565
-82	-0.58963119	-32	1.23337782	18	3.05638682	68	4.87939583
-81	-0.55317101	-31	1.269838	19	3.092847	69	4.91585601
-80	-0.51671083	-30	1.30629818	20	3.12930718	70	4.95231619
-79	-0.48025065	-29	1.34275836	21	3.16576736	71	4.98877637
-78	-0.44379047	-28	1.37921854	22	3.20222754	72	5.02523655

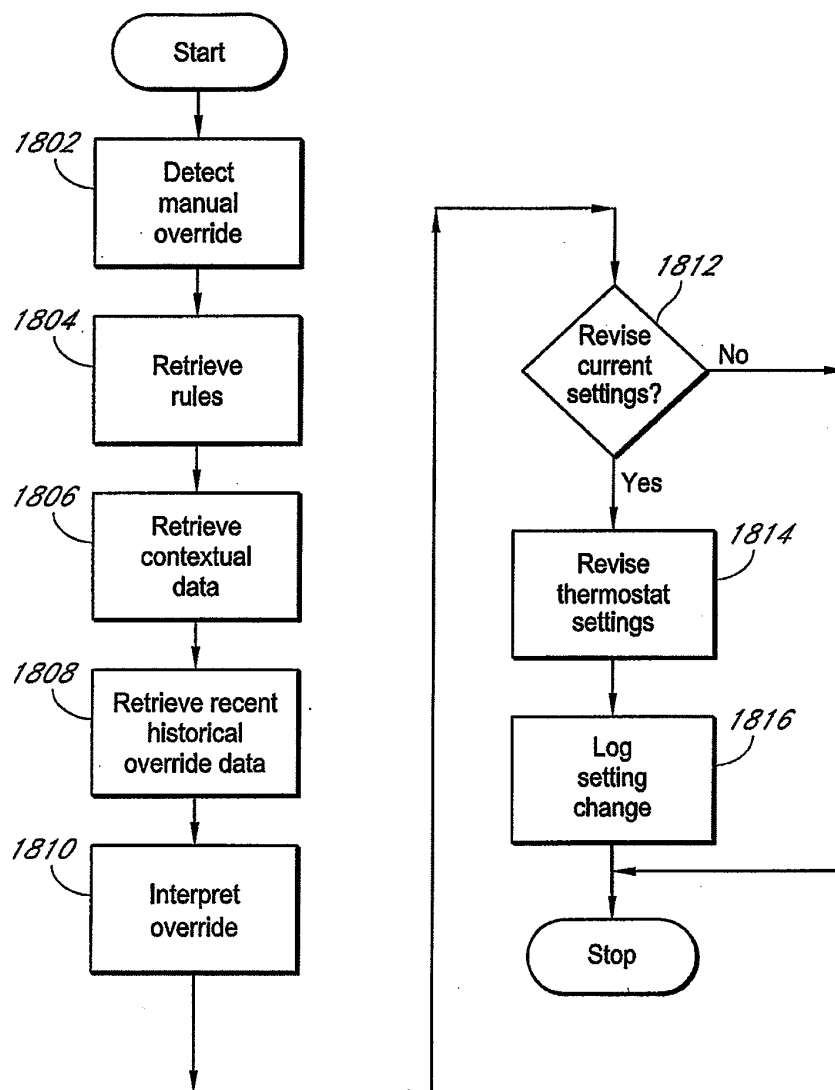
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-77	-0.40733029	-27	1.41567872	23	3.23868772	73	5.06169673
-76	-0.37087011	-26	1.4521389	24	3.27514791	74	5.09915691
-75	-0.33440993	-25	1.48859908	25	3.31160809	75	5.13461709
-74	-0.29794975	-24	1.52505926	26	3.34806827	76	5.17107727
-73	-0.26148957	-23	1.56151944	27	3.38452845	77	5.20753745
-72	-0.22502939	-22	1.59797962	28	3.42098863	78	5.24399763
-71	-0.18856921	-21	1.6344398	29	3.45744881	79	5.28045781
-70	-0.15210903	-20	1.67089998	30	3.49390899	80	5.31691799
-69	-0.11564885	-19	1.70736016	31	3.53036917	81	5.35337817
-68	-0.07918867	-18	1.74382034	32	3.56682935	82	5.38983835
-67	-0.04272849	-17	1.78028052	33	3.60328953	83	5.42629853
-66	-0.00626831	-16	1.8167407	34	3.63974971	84	5.46275871
-65	0.03019187	-15	1.85320088	35	3.67620989	85	5.49921889
-64	0.06665205	-14	1.88966106	36	3.71267007	86	5.53567907
-63	0.10311223	-13	1.92612124	37	3.74913025	87	5.57213925
-62	0.13957241	-12	1.96258142	38	3.78559043	88	5.60859943
-61	0.17603259	-11	1.9990416	39	3.82205061	89	5.64505961
-60	0.21249277	-10	2.03550178	40	3.85851079	90	5.68151979
-59	0.24895295	-9	2.07196196	41	3.89497097	91	5.71797997
-58	0.28541313	-8	2.10842214	42	3.93143115	92	5.75444015
-57	0.32187331	-7	2.14488232	43	3.96789133	93	5.79090033
-56	0.35833349	-6	2.1813425	44	4.00435151	94	5.82736051
-55	0.39479367	-5	2.21780268	45	4.04081169	95	5.86382069
-54	0.43125385	-4	2.25426286	46	4.07727187	96	5.90028087
-53	0.46771403	-3	2.29072304	47	4.11373205	97	5.93674105
-52	0.50417421	-2	2.32718322	48	4.15019223	98	5.97320123
-51	0.54063439	-1	2.3636434	49	4.18665241	99	6.00966142
-50	0.57709457	0	2.40010358	50	4.22311259		

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FIG. 16-2

*FIG. 17*

*FIG. 18*

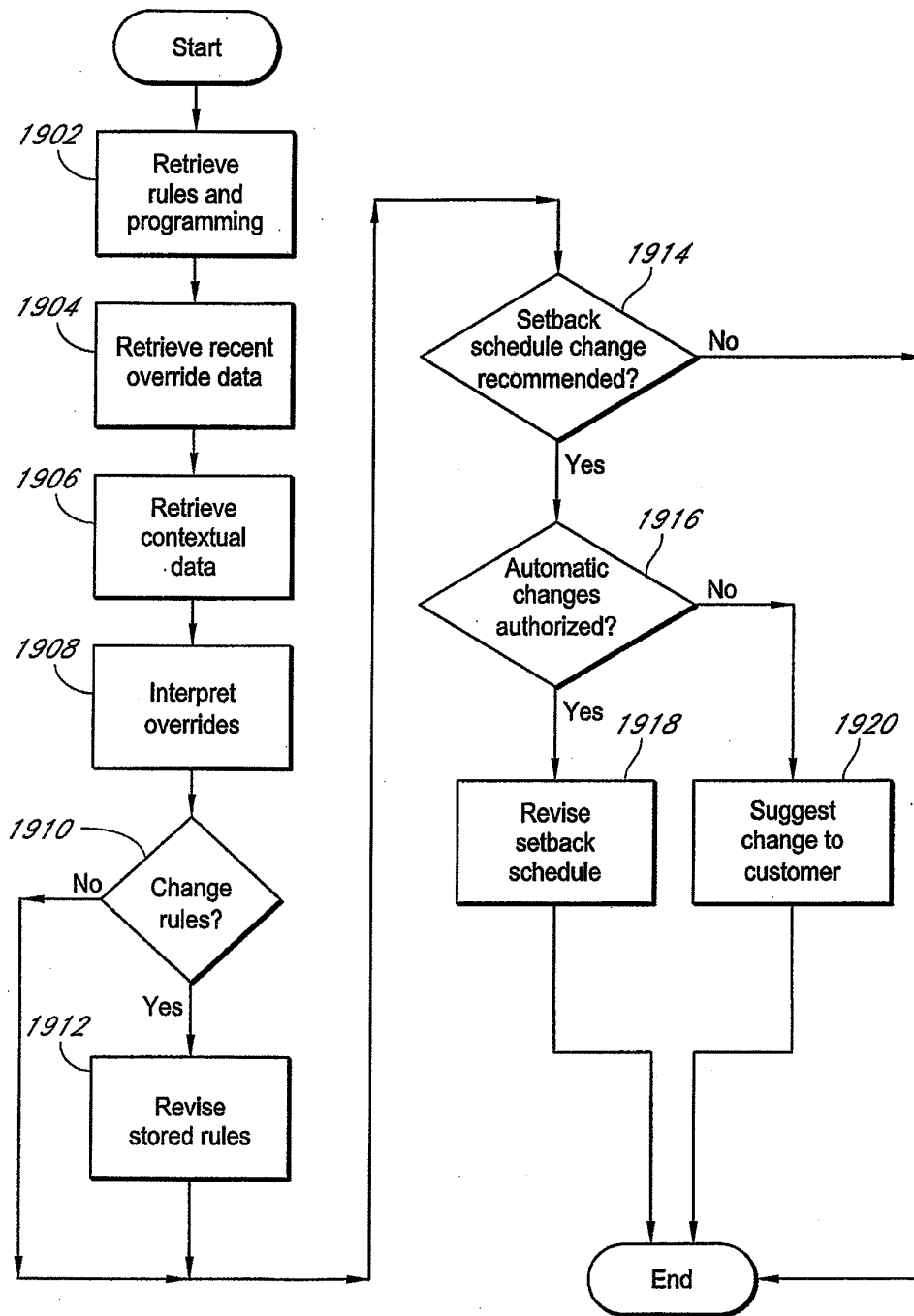


FIG. 19

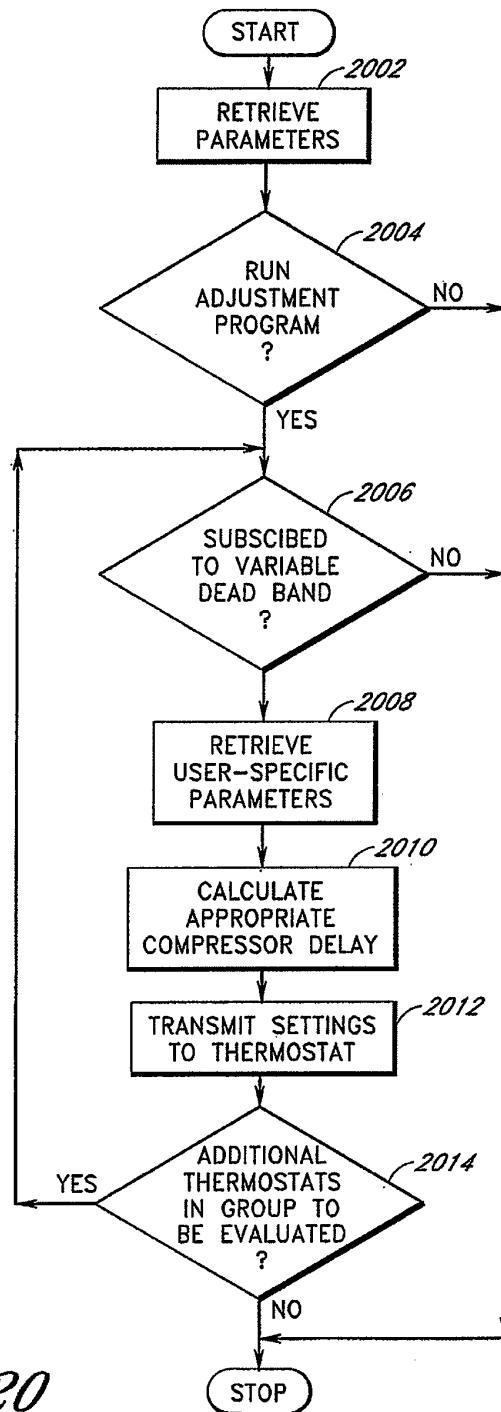
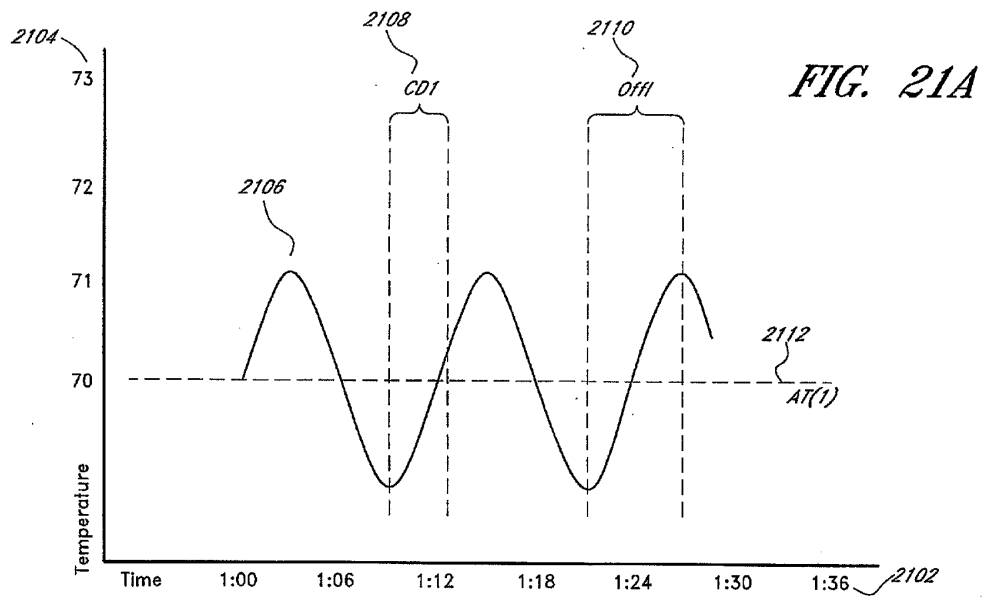
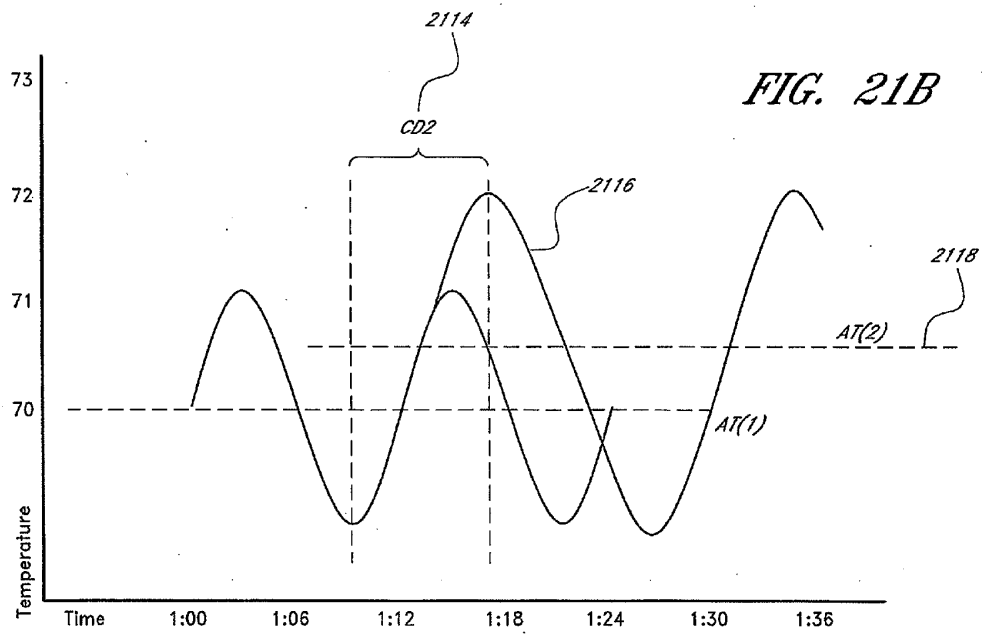


FIG. 20



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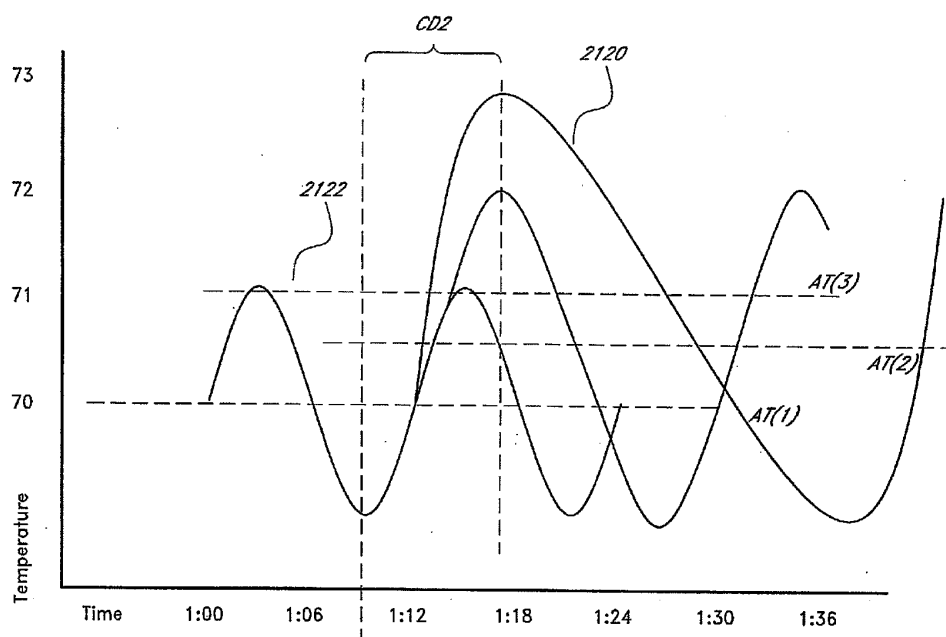
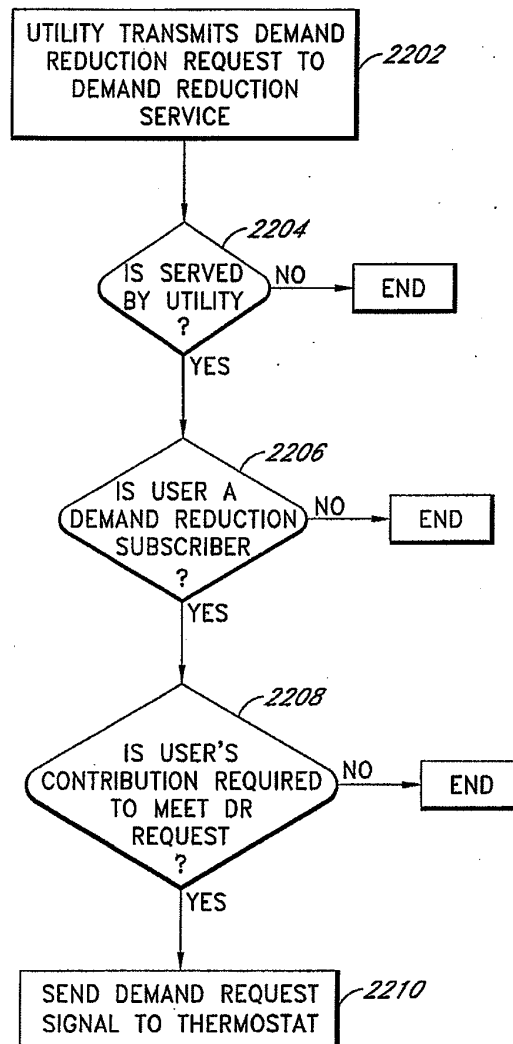
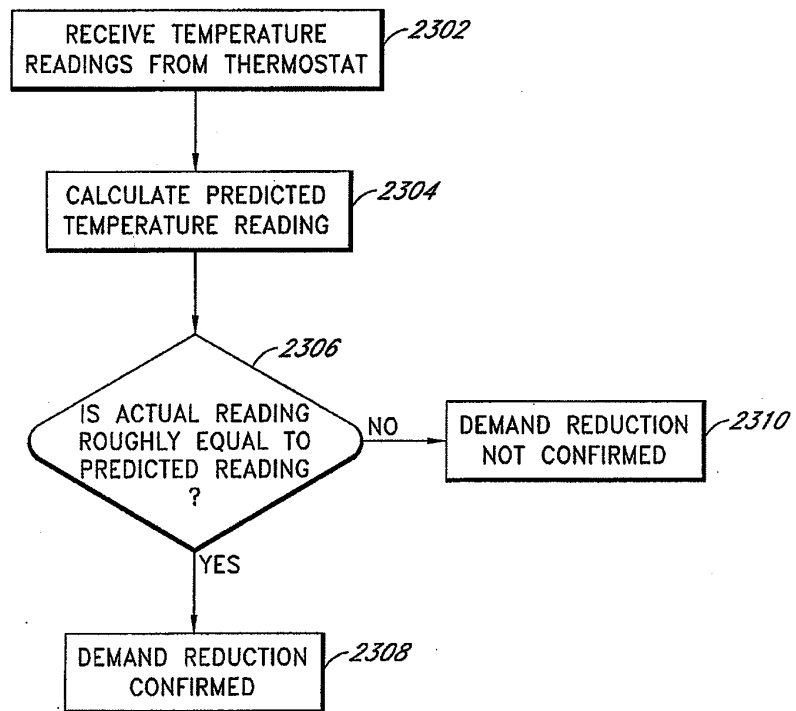


FIG. 21C

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*FIG. 22*

*FIG. 23*

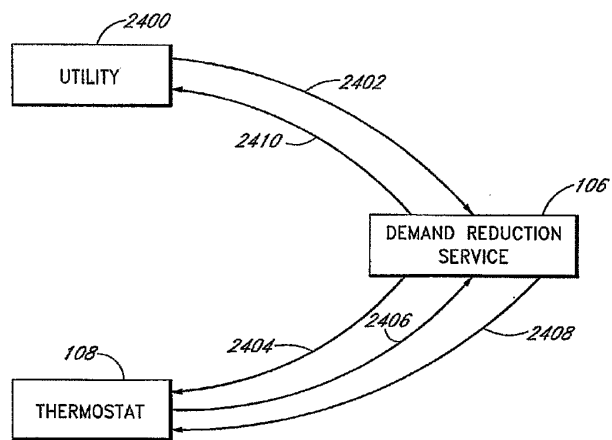


FIG. 24

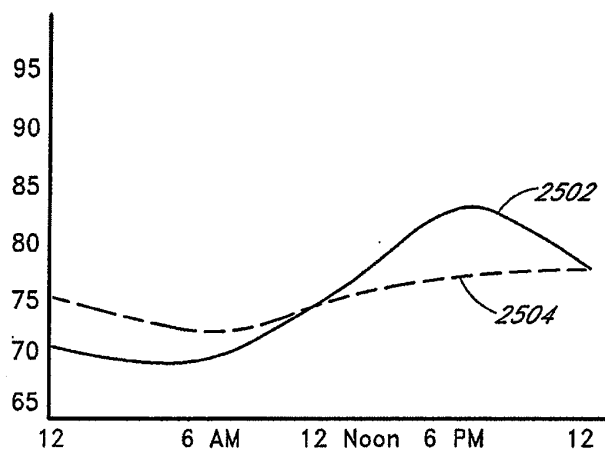


FIG. 25A

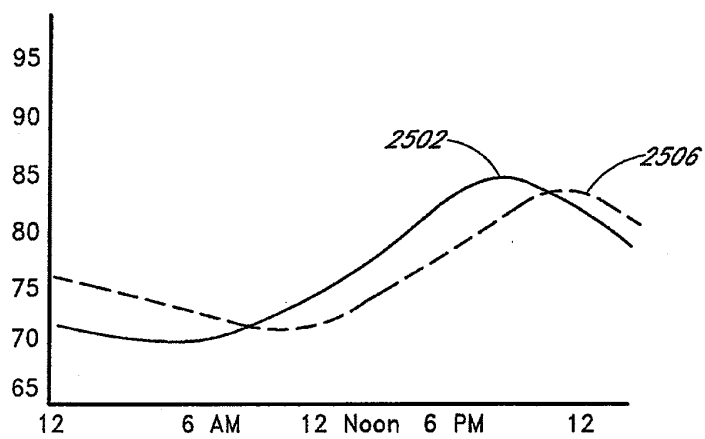


FIG. 25B

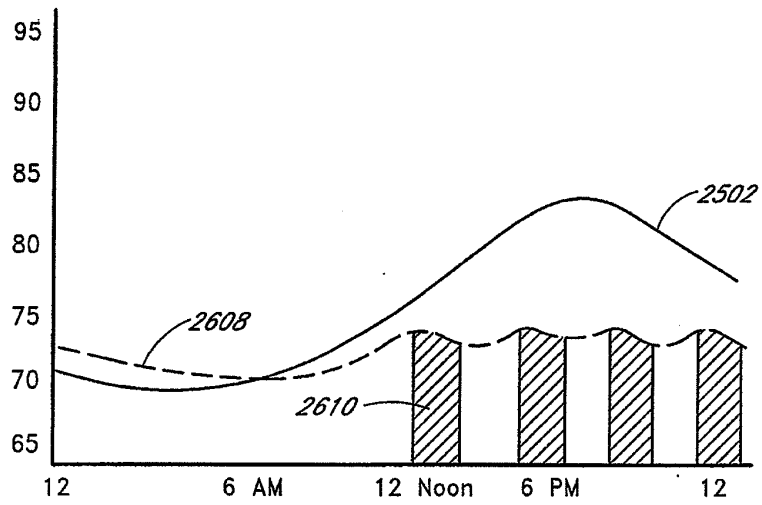


FIG. 26A

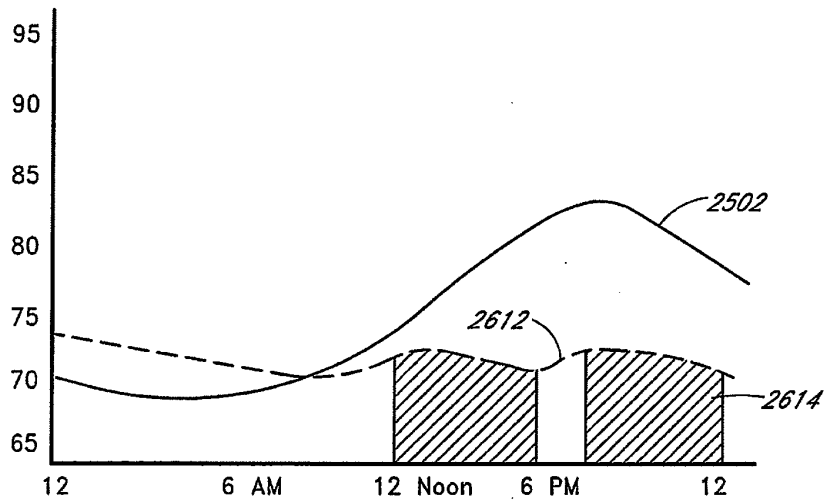


FIG. 26B

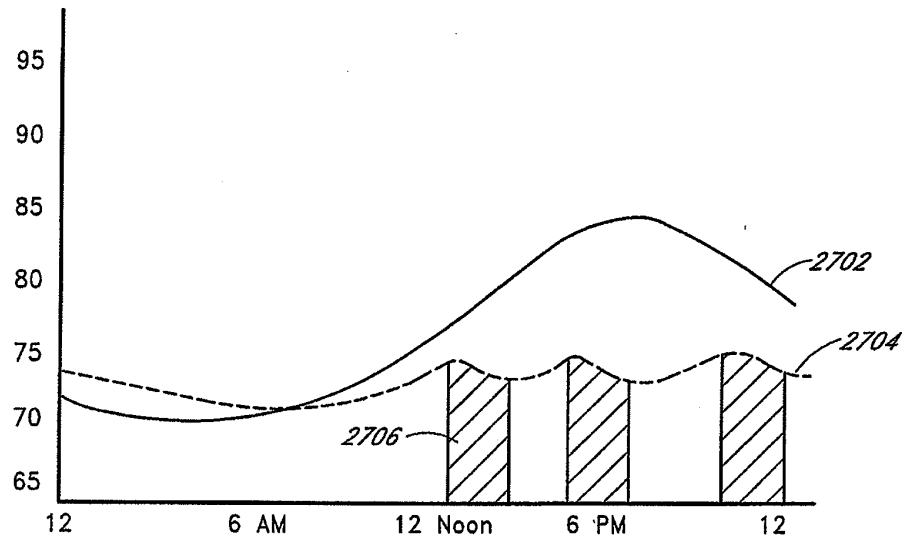


FIG. 27A

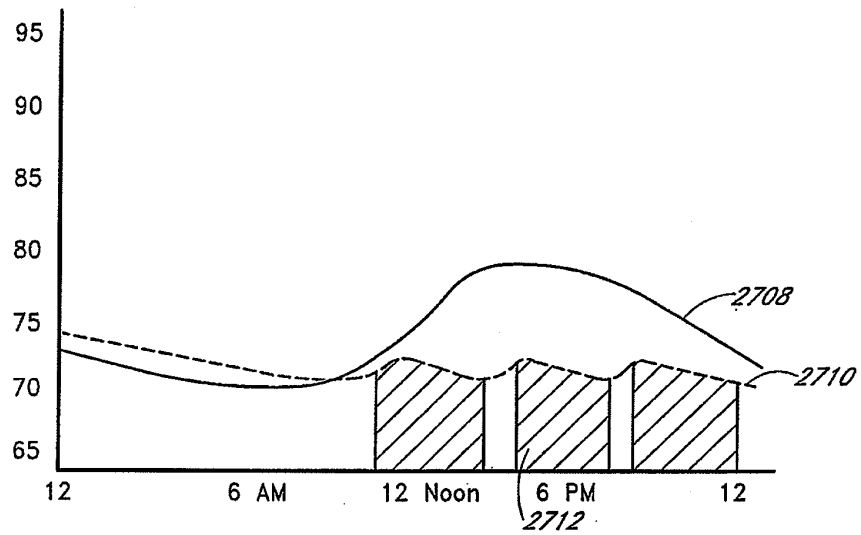
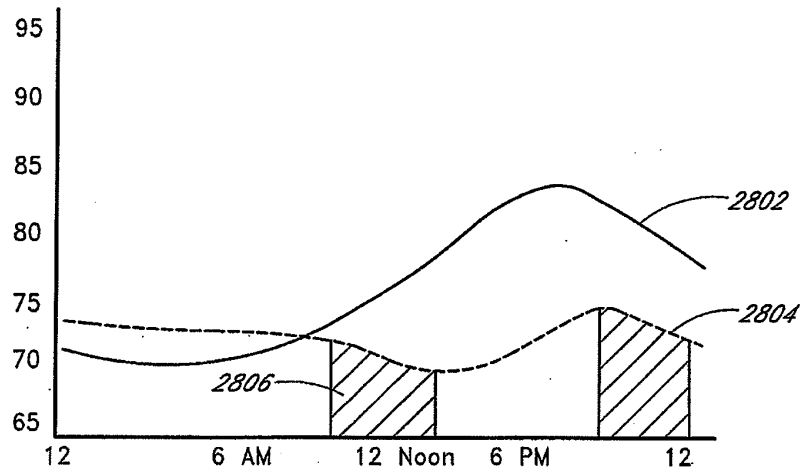
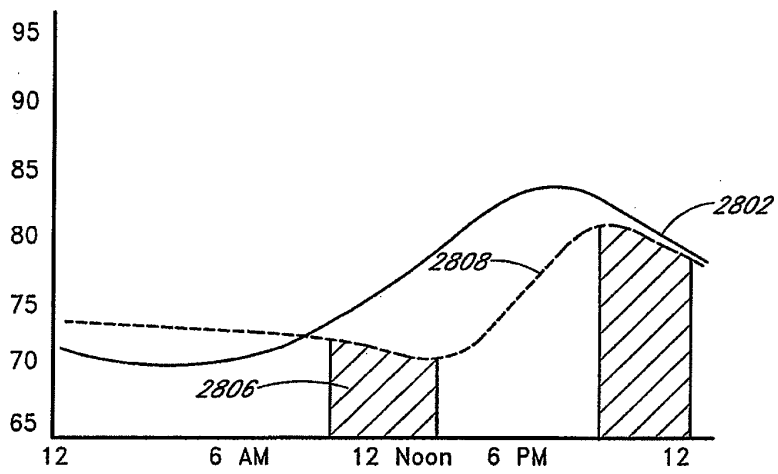


FIG. 27B

*FIG. 28A**FIG. 28B*

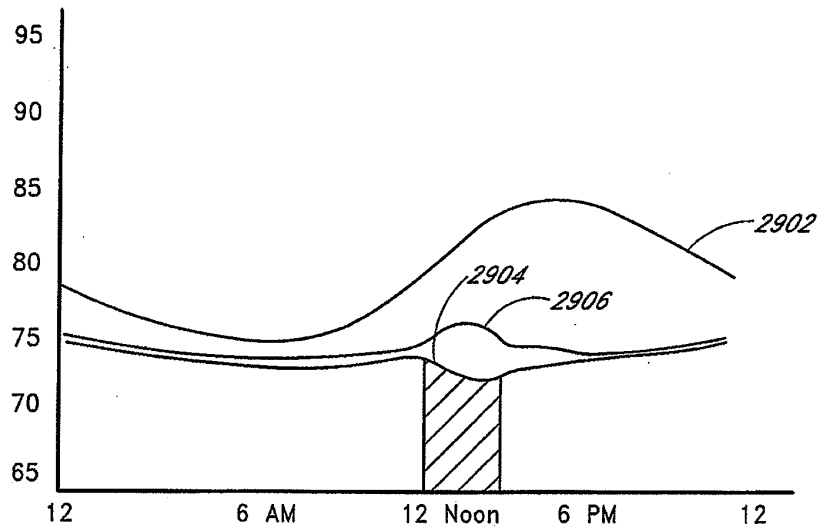


FIG. 29A

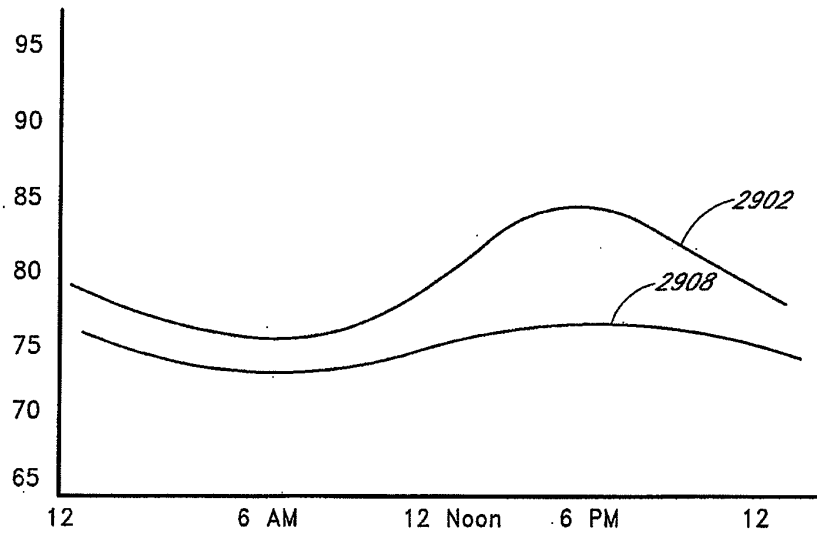
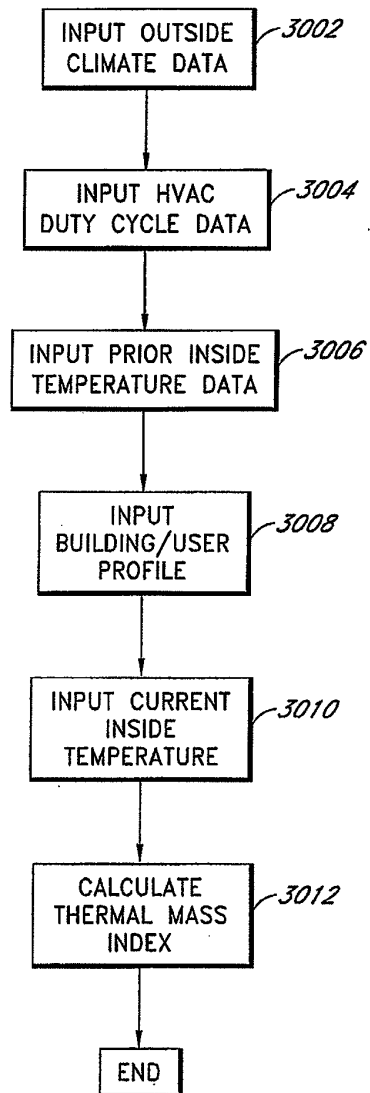


FIG. 29B

*FIG. 30*

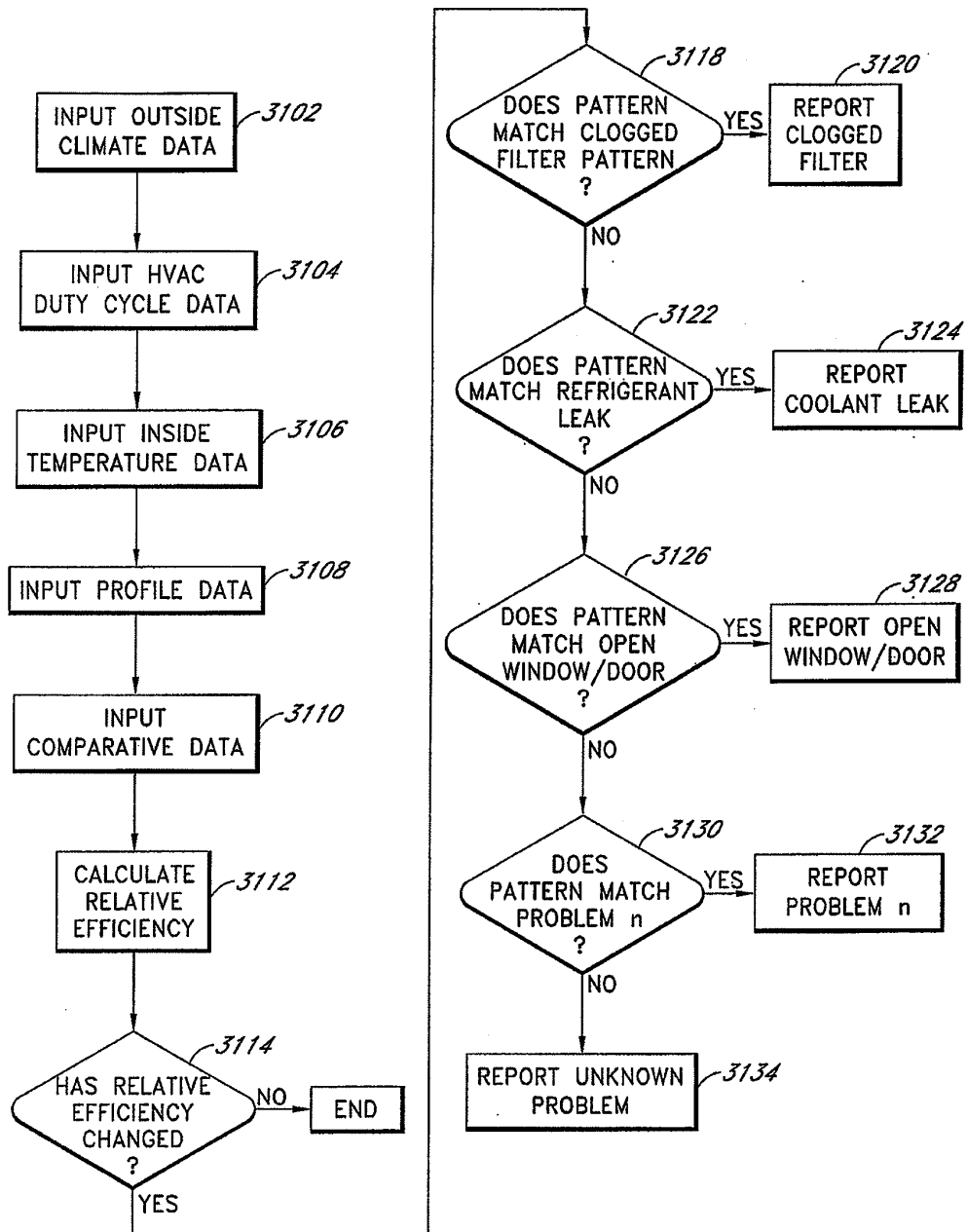


FIG. 31

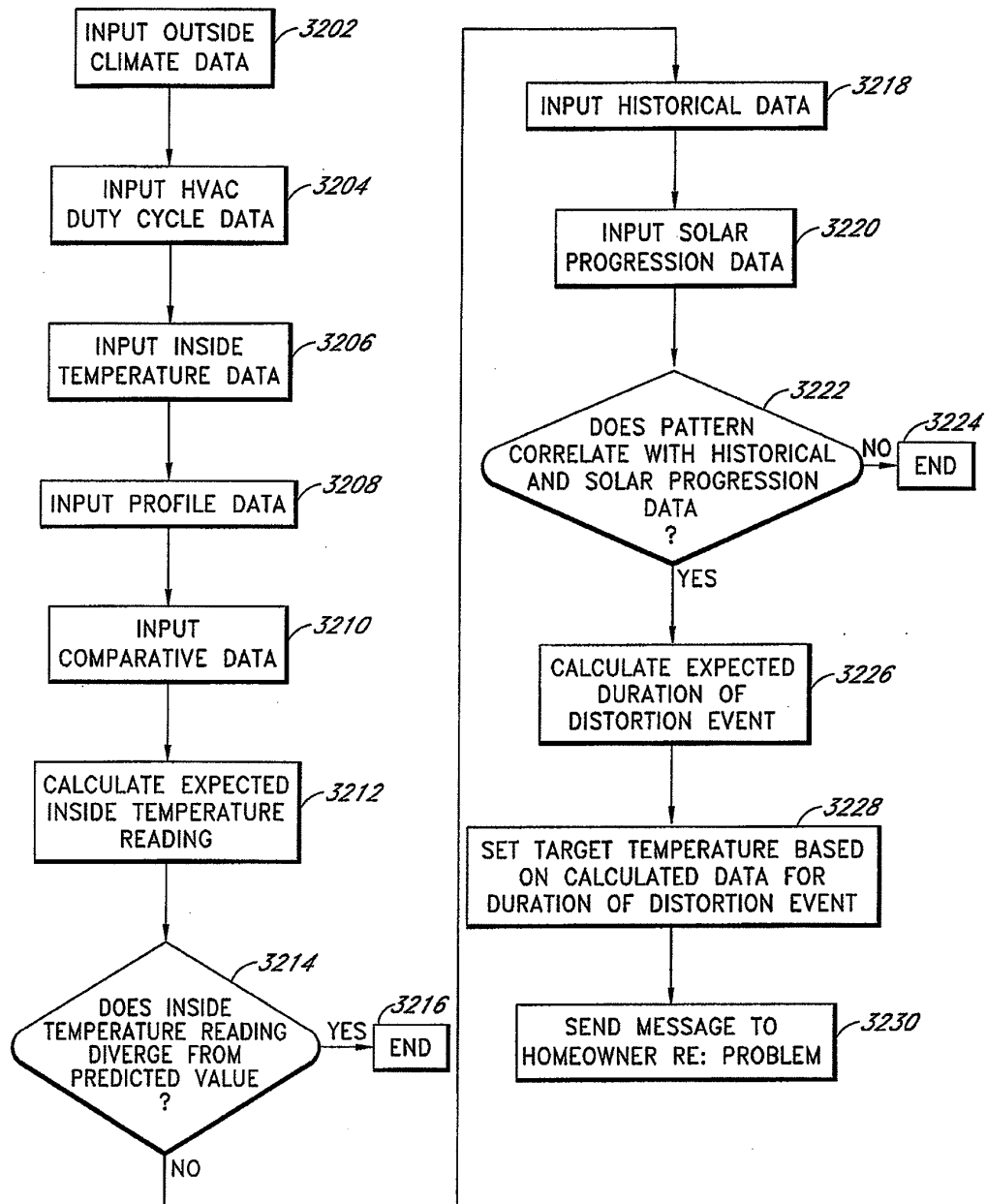


FIG. 32

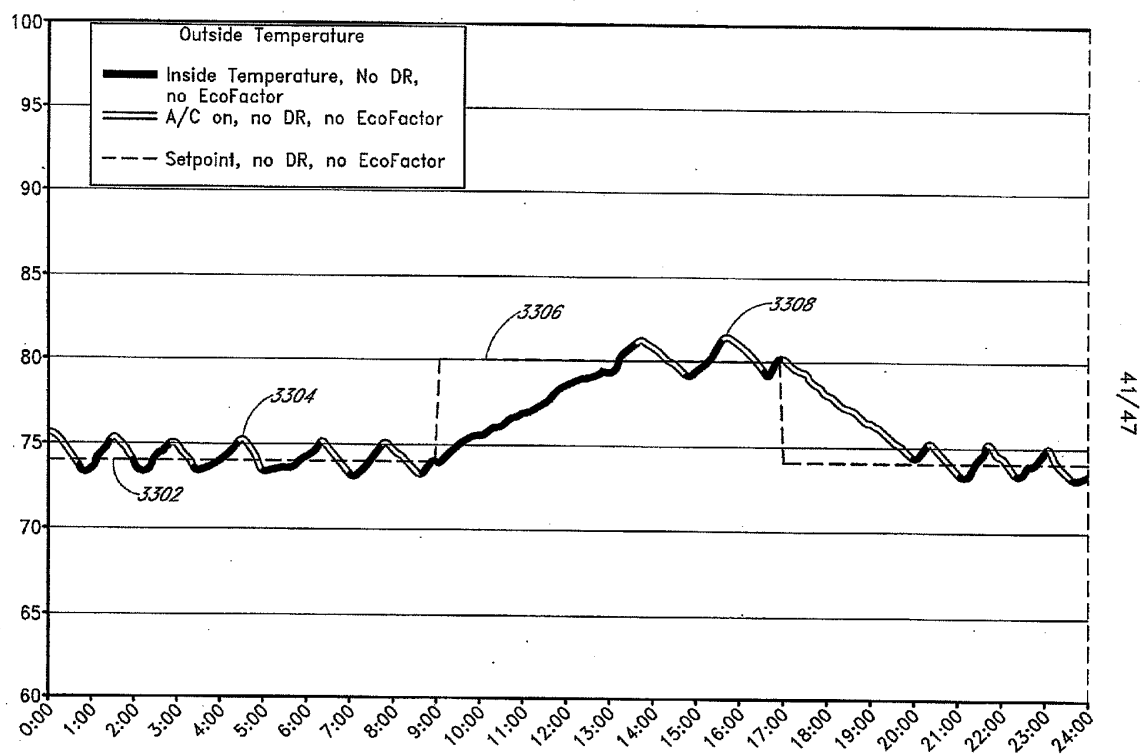


FIG. 33

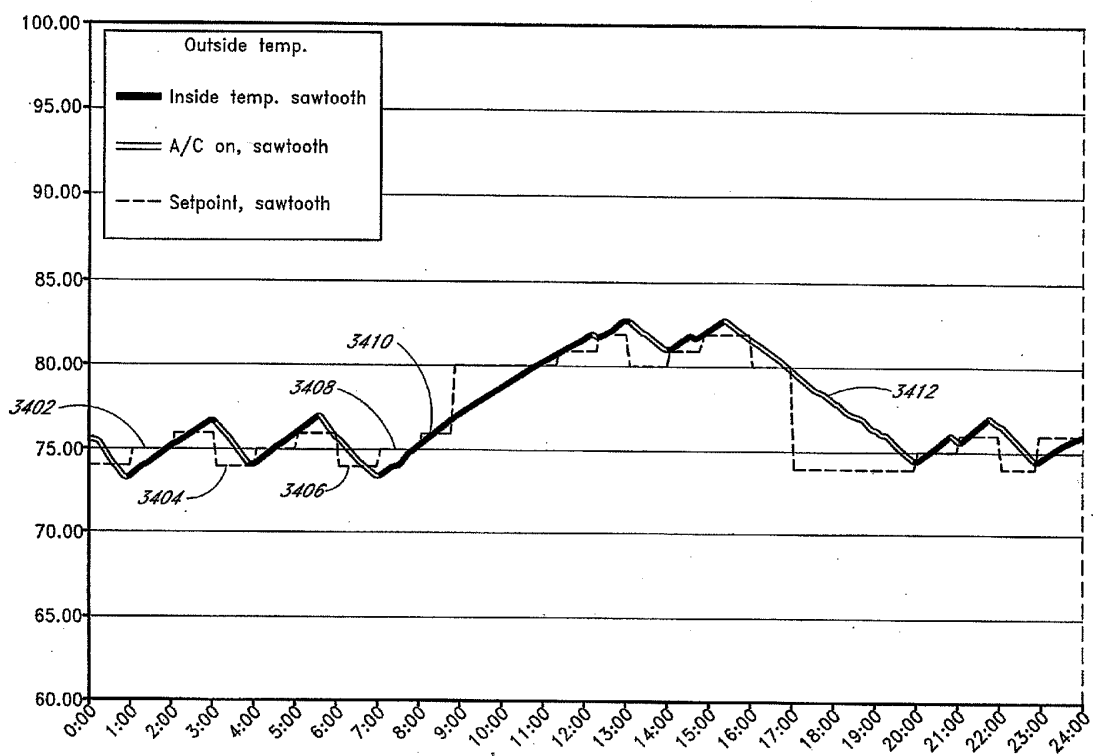


FIG. 34

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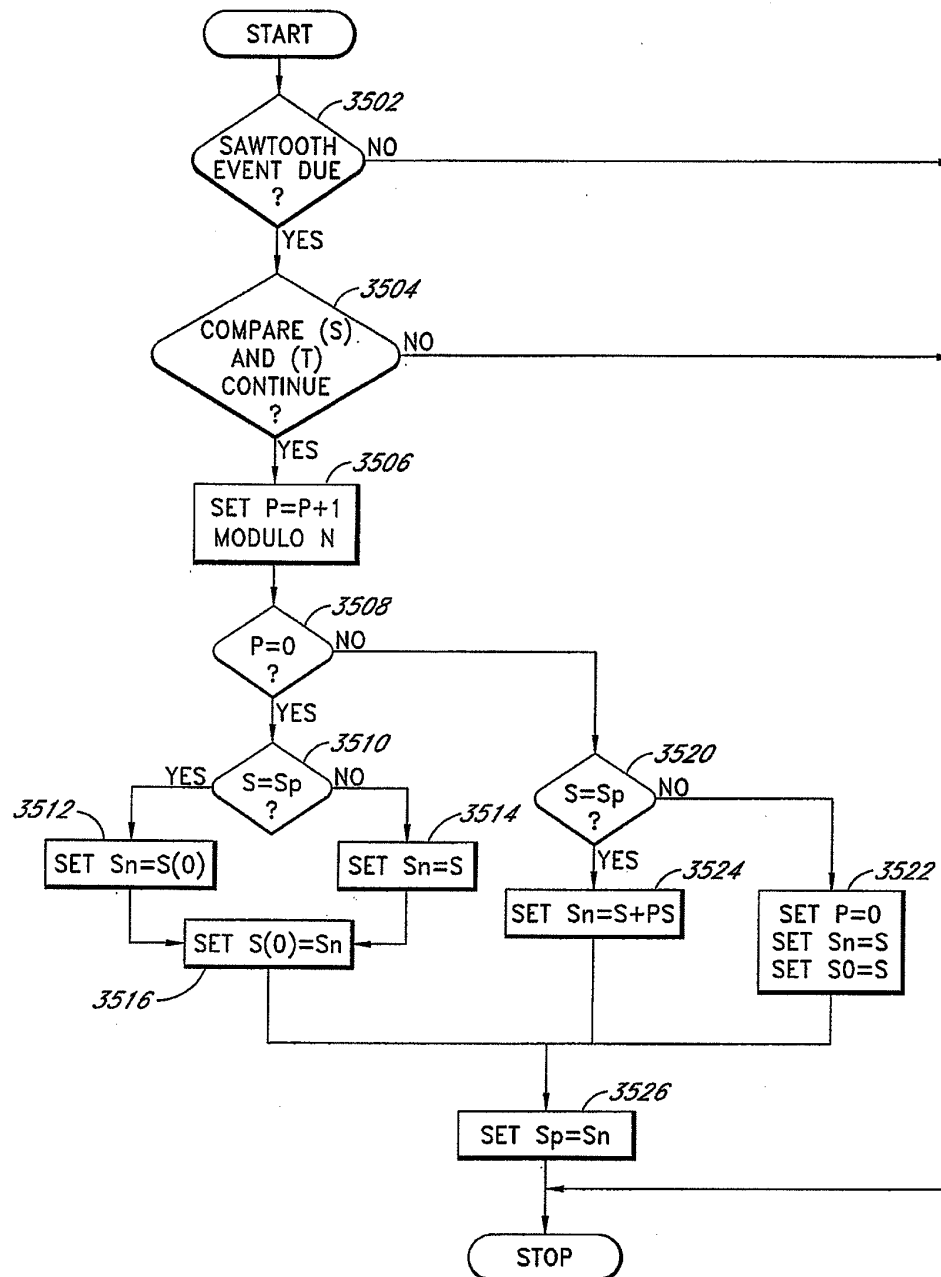


FIG. 35

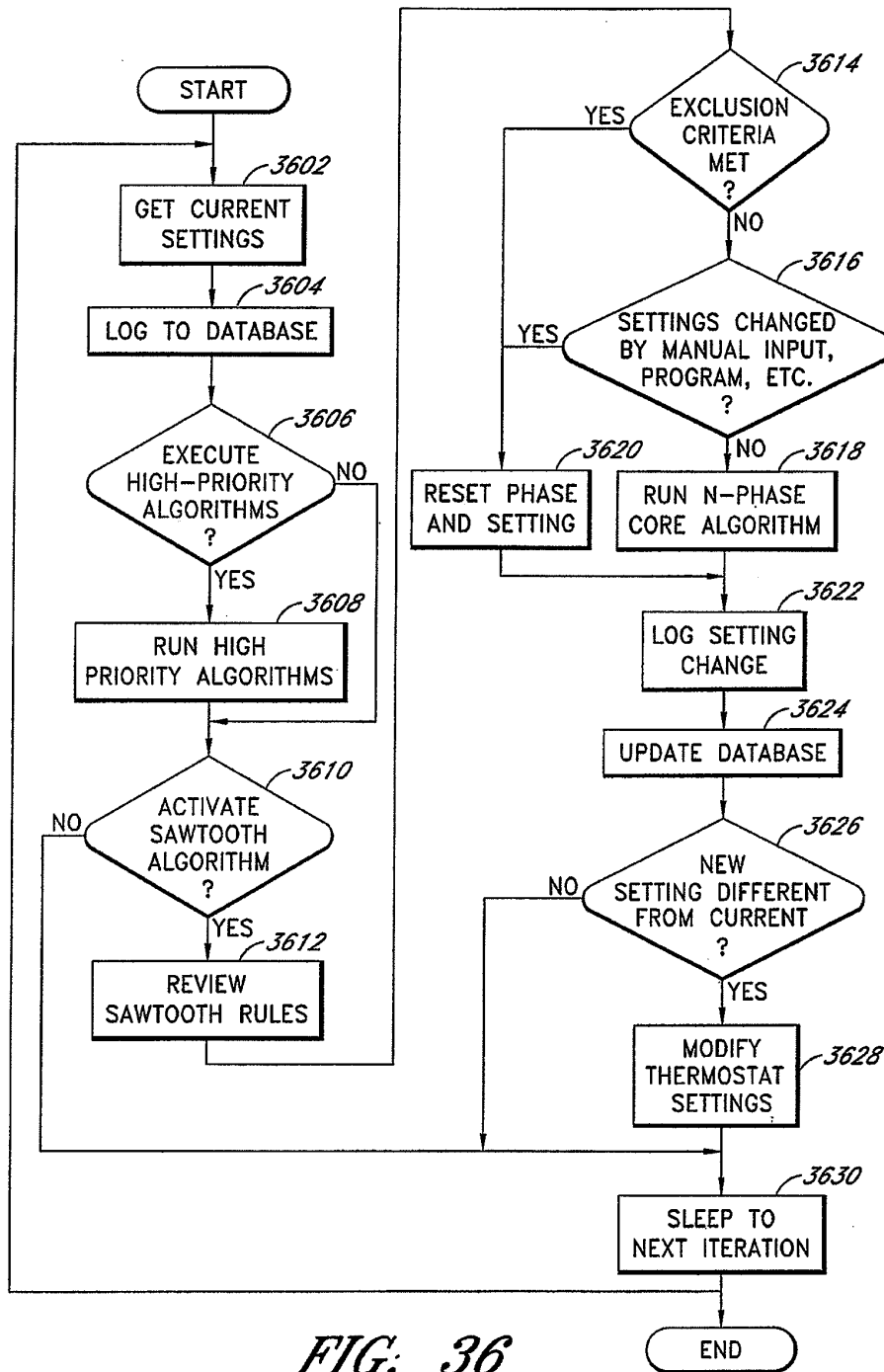


FIG. 36

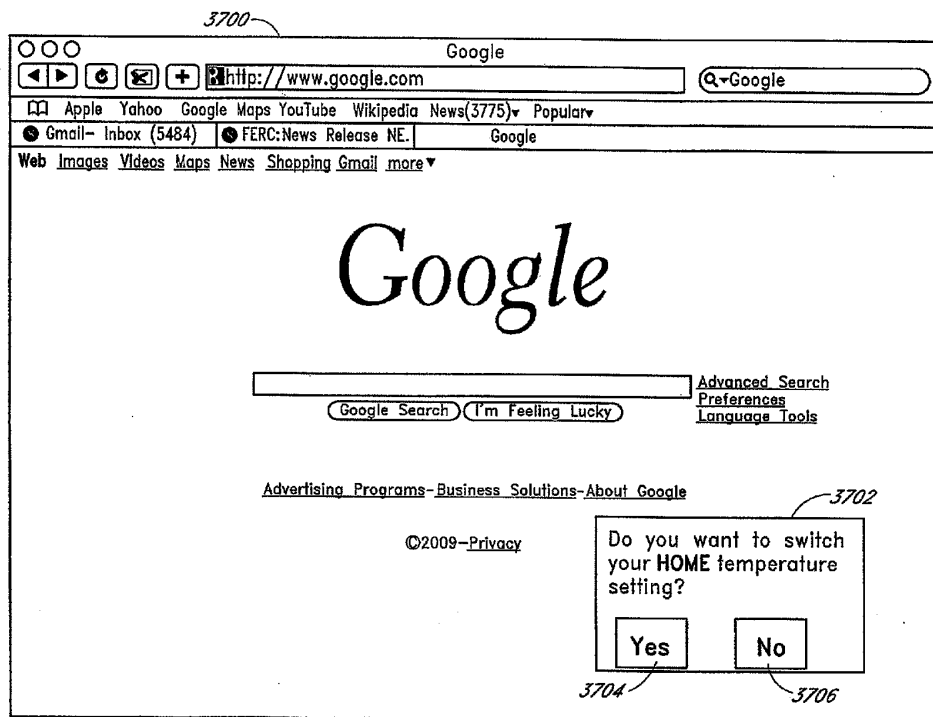


FIG. 37

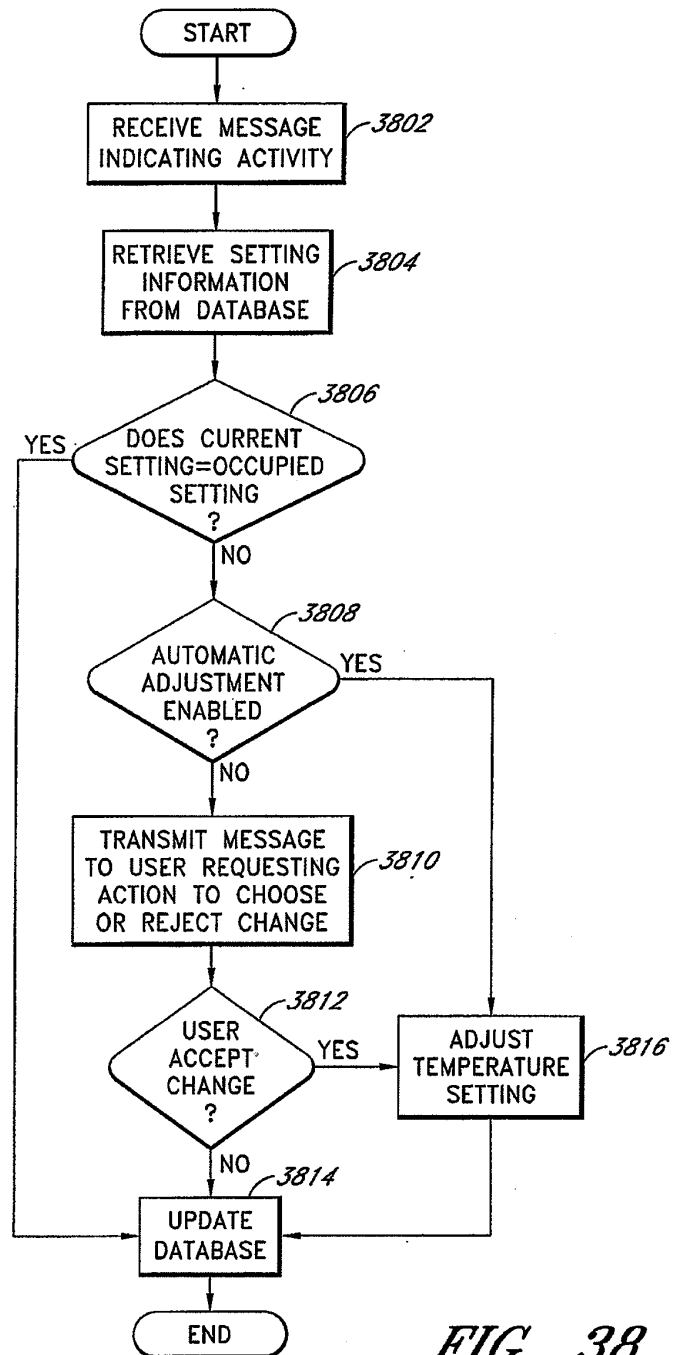
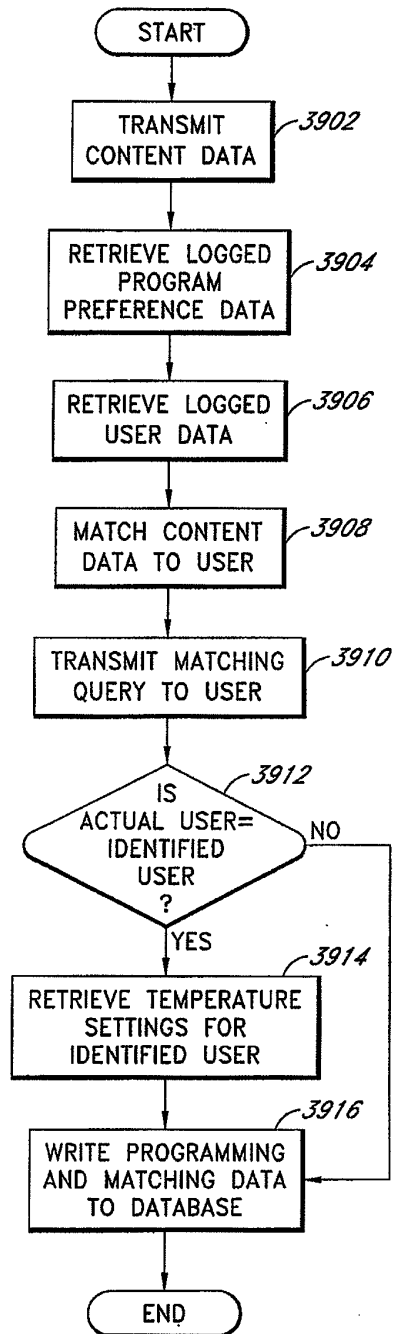


FIG. 38

*FIG. 39*

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
-------------------------------	---

As the below named inventor, I hereby declare that:

This declaration is directed to: ☐ The attached application, or
☒ United States application or PCT international application number 14/048932
filed on October 8, 2013

The above-identified application was made or authorized to be made by me.

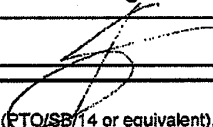
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: John Douglas Steinberg Date (Optional): 11/5/13
Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt	
EFS ID:	29427762
Application Number:	15616719
International Application Number:	
Confirmation Number:	1263
Title of Invention:	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
First Named Inventor/Applicant Name:	John Douglas Steinberg
Customer Number:	20995
Filer:	John R. King/Gustavo Lopez
Filer Authorized By:	John R. King
Attorney Docket Number:	EFACT.012C3
Receipt Date:	07-JUN-2017
Filing Date:	
Time Stamp:	18:14:31
Application Type:	Utility under 35 USC 111(a)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	EFACT-012C3_ADS.pdf	1823238	no	8
			146adb31804850fdeab3b002800dc309c0f69f7		

Warnings:

Information:					
2		EFACT-012C3_specification.pdf	263818	yes	54
			c2eb5445b6d5e8deb17e6a3140e25d19ce9d0a87		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	52	
	Claims		53	53	
	Abstract		54	54	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	EFACT-012C3_drawings.pdf	1272150	no	47
			8297864ab6ae5fcbcaeb1164db5e0fbc4fdfd760		
Warnings:					
Information:					
4	Oath or Declaration filed	EFACT-012C3_declaration.pdf	81981	no	1
			cf776303f6fef0d1a202f99ec8971ae487462079		
Warnings:					
Information:					
Total Files Size (in bytes):			3441187		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national and security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/616,719	06/07/2017	John Douglas Steinberg	EFACT.012C3

CONFIRMATION NO. 1263

FORMALITIES LETTER



20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 06/16/2017

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.

The surcharge is due for any one of:

- late submission of the basic filing fee, search fee, or examination fee,
- late submission of inventor's oath or declaration,
- filing an application that does not contain at least one claim on filing, or
- submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- \$ **70** basic filing fee.
- \$ **70** surcharge.
- \$ **300** search fee.
- \$ **360** examination fee.
- \$(**0**) previous unapplied payment amount.
- \$ **800** TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice".
<https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mhaile/

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/616,719	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	1	minus 20 = *	x 40 =	0.00			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
			TOTAL	730		TOTAL	
* If the difference in column 1 is less than zero, enter "0" in column 2.							
APPLICATION AS AMENDED - PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =		x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =		x =
	Application Size Fee (37 CFR 1.16(s))						
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
				TOTAL ADD'L FEE		TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =		x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =		x =
	Application Size Fee (37 CFR 1.16(s))						
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
				TOTAL ADD'L FEE		TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.							



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/616,719	06/07/2017	3744	0.00	EFACT.012C3	1	1

CONFIRMATION NO. 1263

FILING RECEIPT



000000092081262

20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 06/16/2017

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

John Douglas Steinberg, Millbrae, CA;

Applicant(s)

EcoFactor, Inc., Redwood City, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 14/491,554 09/19/2014
which is a CON of 14/048,932 10/08/2013 PAT 8840033
which is a CON of 12/788,246 05/26/2010 PAT 8556188

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 06/14/2017

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/616,719**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM

Preliminary Class

236

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor	: John Douglas Steinberg
App. No.	: 15/616,719
Filed	: June 7, 2017
For	: SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
Examiner	: Unknown
Art Unit	: 3744
Conf. No.	: 1263

PRELIMINARY AMENDMENT**Mail Stop Amendment**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

Prior to examination of this application, Applicants respectfully submit the following amendments and comments.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 5 of this paper.

AMENDMENTS TO THE CLAIMS

Please cancel Claim 1 without prejudice and add new Claims 2-21 as indicated below.

1. (Canceled)
2. (New) A method for adjusting at least one temperature setpoint of an HVAC system associated with a structure, the method comprising:
 - associating the at least one mobile electronic device with the structure;
 - receiving with one or more computer processors, the geographic location of the at least one mobile electronic device;
 - receiving with one or more computer processors, at least a measurement of a temperature obtained from within the structure and predicting a length of time to reach a desired temperature;
 - predicting a length of time for a user of the at least one mobile electronic device to reach the structure; and
 - adjusting with one or more computer processors, at least one temperature setpoint of an HVAC system associated with the structure based at least in part upon the predicted length of time to reach the desired temperature and upon the predicted length of time for a user of the mobile electronic device to reach the structure.
3. (New) The method of claim 2 further comprising using data associated with the mobile electronic device to adjust the predicted length of time to reach the structure based on characteristics of a location the user has stopped at before reaching the structure.
4. (New) The method of claim 2 wherein the mobile electronic device is a telephone.
5. (New) The method of claim 2 wherein the mobile electronic device is connected to the Internet.

6. (New) The method of claim 2 wherein the geographic location of a mobile electronic device is based upon the actual or estimated distance between the mobile electronic device and one or more antennas used to receive radio signals from the mobile electronic device.

7. (New) The method of claim 2 wherein the one or more processors comprise a remote server that is remotely located from the structure.

8. (New) The method of claim 2 wherein adjusting the at least one temperature setpoint is logged to a database.

9. (New) The method of claim in 2 wherein adjusting the at least one temperature setpoint is initiated by a remote computer.

10. (New) The method of claim 2 wherein adjusting the at least one temperature setpoint occurs without specific intervention by said user of said mobile electronic device.

11. (New) The method of claim 2 wherein the user is prompted to confirm occupancy of the structure prior to adjustment of the at least one temperature setpoint.

12. (New) A system for adjusting at least one temperature setpoint of an HVAC system associated with a structure, the system comprising:

one or more computer processors that associate at least one mobile electronic device with the structure;

the one or more computer processors receive a geographic location of the at least one mobile electronic device;

the one or more computer processors receive at least a measurement of a temperature obtained from within the structure and predict a length of time to reach a desired temperature;

the one or more computer processors use traffic data to predict a length of time for a user of the at least one mobile electronic device to reach the structure; and

the one or more computer processors adjust at least one temperature setpoint associated with the structure based at least in part upon the predicted length of time to reach the desired temperature, and at least in part upon the predicted length of time for a user of the mobile electronic device to reach the structure.

13. (New) The method of claim 12 wherein the one or more processors use geospatial data associated with the mobile electronic unit to increase the predicted length of time to reach the structure based on characteristics of a location the user has stopped at before reaching the structure.

14. (New) The system of claim 12 wherein the mobile electronic device is a telephone.

15. (New) The system of claim 12 wherein the mobile electronic device is connected to the Internet.

16. (New) The system of claim 12 wherein the geographic location of the mobile electronic device is based upon estimation of the distance between the mobile electronic device and one or more antennas used to receive radio signals from the mobile electronic device.

17. (New) The system of claim 12 wherein the one or more computer processors comprise a remote server that is remotely located from the structure.

18. (New) The system of claim 12 wherein adjustment of the at least one temperature setpoint is logged to a database.

19. (New) The system of claim in 12 wherein adjustment of the at least one temperature setpoint is initiated by a remote computer.

20. (New) The system of claim 12 wherein the at least one temperature setpoint is adjusted automatically.

21. (New) The system of claim 12 wherein the user is prompted to confirm occupancy prior to adjustment of the at least one temperature setpoint.

Application No.: 15/616,719
Filing Date: June 7, 2017

REMARKS

In this amendment, Applicant cancels Claim 1 and adds new Claims 2-21.

OTHER APPLICATIONS OF ASSIGNEE

Applicant wishes to draw the Examiner's attention to the following applications owned by of the present application's assignee:

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Steinberg et al.	60/963,183 Now Expired	08/03/07	EFACT.003PR	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	60/944,011 Now Expired	09/17/07	EFACT.005PR	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	12/183,949 Now Pat. 7,908,116	07/31/08	EFACT.004A	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	12/183,990 Now Pat. 7,908,117	07/31/08	EFACT.003A	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	12/211,690 Now Pat. 8,019,567	09/16/08	EFACT.006A	System And Method For Evaluating Changes In The Efficiency Of An HVAC System
Steinberg et al.	12/211,733 Now Pat. 7,848,900	09/16/08	EFACT.005A	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	61/215,657 Now Expired	05/08/09	EFACT.009PR	System, Method And Apparatus For Just-In-Time Conditioning Using A Thermostat
Steinberg	61/215,816 Now Expired	05/11/09	EFACT.008PR	System, Method And Apparatus For Dynamically Variable Compressor Delay In Thermostat To Reduce Energy Consumption
Steinberg et al.	61/215,999 Now Expired	05/12/09	EFACT.007PR	System, Method And Apparatus For Identifying Manual Inputs To And Adaptive Programming Of A Thermostat

Application No.: 15/616,719
Filing Date: June 7, 2017

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Cheung et al.	12/498,142 Now Pat. 8,010,237	07/06/09	EFACT.010A	System And Method For Using Ramped Setpoint Temperature Variation With Networked Thermostats To Improve Efficiency
Steinberg	12/502,064 Now Pat. 8,180,492	07/13/09	EFACT.011A	System And Method For Using A Networked Electronic Device As An Occupancy Sensor For An Energy Management System
Steinberg et al.	12/773,690 Now Pat. 8,498,753	05/04/10	EFACT.009A	System, Method And Apparatus For Just-In-Time Conditioning Using A Thermostat
Steinberg	12/774,580 Now Pat. 8,740,100	05/05/10	EFACT.008A	System, Method And Apparatus For Dynamically Variable Compressor Delay In Thermostat To Reduce Energy Consumption
Steinberg et al.	12/778,052 Now Pat. 8,596,550	05/11/10	EFACT.007A	System, Method And Apparatus For Identifying Manual Inputs To And Adaptive Programming Of A Thermostat
Steinberg	12/788,246 Now Pat. 8,556,188	05/26/10	EFACT.012A	System And Method For Using A Mobile Electronic Device To Optimize An Energy Management System
Steinberg	12/860,821 Now Pat. 8,090,477	08/20/10	EFACT.013A	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg et al.	12/959,225 Now Pat. 8,131,497	12/02/10	EFACT.005C1	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	13/037,162 Now Pat. 8,131,506	02/28/11	EFACT.004C1	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Cheung et al.	13/219,381 Now Pat. 9,134,710	08/26/11	EFACT.010C1	System And Method For Using Ramped Setpoint Temperature Variation With Networked Thermostats To Improve Efficiency
Steinberg et al.	13/230,610 Now Pat. 8,423,322	09/12/11	EFACT.006C1	System And Method For Evaluating Changes In The Efficiency Of An HVAC System

Application No.: 15/616,719
Filing Date: June 7, 2017

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Steinberg	13/329,117 Now Pat. 8,340,826	12/16/1 1	EFACT.013C1	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg et al.	13/409,697 Now Pat. 8,412,488	03/01/1 2	EFACT.004C2	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	13/409,729 Now Pat. 8,886,488	03/01/1 2	EFACT.005C2	System And Method For Calculating The Thermal Mass Of A Building
Steinberg	13/470,074 Now Pat. 9,244,470	05/11/1 2	EFACT.011C1	System And Method For Using A Wireless Device As A Sensor For An Energy Management System
Hublou et al.	13/523,697 Published 2013/0338837	06/14/1 2	EFACT.014A	System And Method For Optimizing Use Of Individual HVAC Units In Multi-Unit Chiller-Based Systems
Steinberg	13/725,447 Now Pat. 8,712,590	12/21/1 2	EFACT.013C2	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg et al.	13/852,577 Now Pat. 8,738,327	03/28/1 3	EFACT.004C3	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg et al.	13/858,710 Now Pat. 8,751,186	04/08/1 3	EFACT.005C3	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	13/861,189 Now Pat. 9,057,649	04/11/1 3	EFACT.006C2	System And Method For Evaluating Changes In The Efficiency Of An HVAC System
Steinberg et al.	13/952,253 Abandoned	07/26/1 3	EFACT.009C1	System, Method And Apparatus For Just-In-Time Conditioning Using A Thermostat
Steinberg	14/048,932 Now Pat. 8,840,033	10/08/1 3	EFACT.012C1	System And Method For Using A Mobile Electronic Device To Optimize An Energy Management System
Steinberg et al.	14/082,675 Now Pat. 9,194,597	11/18/1 3	EFACT.007C1	System, Method And Apparatus For Identifying Manual Inputs To And Adaptive Programming Of A Thermostat

Application No.: 15/616,719
Filing Date: June 7, 2017

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Steinberg	14/263,762 Now Pat. 9,188,994	04/28/14	EFACT.013C3	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg et al.	14/285,384 Published 2015/0043615	05/22/14	EFACT.004C4	System And Method For Using A Network Of Thermostats As Tool To Verify Peak Demand Reduction
Steinberg	14/292,377 Now Pat. 9,279,594	05/30/14	EFACT.008C1	System, Method And Apparatus For Dynamically Variable Compressor Delay In Thermostat To Reduce Energy Consumption
Steinberg	14/491,554 Published 2015/0168001	09/19/14	EFACT.012C2	System And Method For Using A Mobile Electronic Device To Optimize An Energy Management System
Steinberg et al.	14/527,433 Abandoned	10/29/14	EFACT.005C4	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	14/731,221 Published As 2015/0345822	06/04/15	EFACT.006C3	System And Method For Evaluating Changes In The Efficiency Of An HVAC System
Cheung et al.	14/842,134 Published As 2016/0061474	09/01/15	EFACT.010C2	System And Method For Using Ramped Setpoint Temperature Variation With Networked Thermostats To Improve Efficiency
Steinberg et al.	14/878,872 Published As 2016/0091219	10/08/15	EFACT.007C2	System, Method And Apparatus For Identifying Manual Inputs To And Adaptive Programming Of A Thermostat
Steinberg	14/920,063 Published As 2016/0097557	10/22/15	EFACT.013C4	System And Method For Optimizing Use Of Plug-In Air Conditioners And Portable Heaters
Steinberg	15/002,791 Published As 2016/0138822	01/21/16	EFACT.011C2	System And Method For Using A Wireless Device As A Sensor For An Energy Management System
Steinberg	15/047352 Published As 2016/0238270	02/18/16	EFACT.008C2	System, Method And Apparatus For Dynamically Variable Compressor Delay In Thermostat To Reduce Energy Consumption

Application No.: 15/616,719
Filing Date: June 7, 2017

Inventors	Appl. No.	Filing Date	Attorney Docket No.	Title
Steinberg et al.	15/060,226 Published As 2016/0258822	03/03/16	EFACT.005C5	System And Method For Calculating The Thermal Mass Of A Building
Steinberg et al.	15/097,078	04/12/16	EFACT.009C2	System, Method And Apparatus For Just-In-Time Conditioning Using A Thermostat
Steinberg et al.	15/426,882	02/07/17	EFACT.005C6	System And Method For Calculating The Thermal Mass Of A Building

Applicant notes that cited references, office actions, responses and notices of allowance currently exist or will exist for the above-referenced matters. Applicant also understands that the Examiner has access to sophisticated online Patent Office computing systems that provide ready access to the full file histories of these matters including, for example, specifications, drawings, pending claims, cited art, office actions, responses, declarations, and notices of allowance.

Rather than submit copies these file histories, Applicant respectfully requests that the Examiner continue to review these file histories online for past, current, and future information about these matters.

Also, if the Examiner cannot readily access these file histories, the Applicant would be pleased to provide any portion of any of the file histories at any time upon specific Examiner request.

NO DISCLAIMERS OR DISAVOWALS

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application.

Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the

Application No.: 15/616,719
Filing Date: June 7, 2017

present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

CONCLUSION

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: August 14, 2017

By: /John R. King/
John R. King
Registration No. 34,362
Registered Practitioner
Customer No. 20,995
(949) 760-0404

26496574

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	15/616719
Filing Date	June 7, 2017
First Named Inventor	John D. Steinberg
Title	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
Art Unit	3744
Examiner Name	Unknown
Attorney Docket Number	EFACT.012C3

SIGNATURE of Applicant or Patent Practitioner

Signature	/John R. King/	Date (Optional)	
Name	John R. King	Registration Number	34362
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)	EcoFactor, Inc.		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..

Document Description: Power of Attorney

PTO/AIA/82B (07-13)

Approved for use through 11/30/2014. OMB 0651-0051

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number

Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)



I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

20995

OR



I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:



The address associated with the above-mentioned Customer Number

OR



The address associated with Customer Number:

OR

Firm or
Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

EcoFactor, Inc.



Inventor or Joint Inventor (title not required below)



Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)



Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)



Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Date (Optional)

11/7/13

Name

John Douglas Steinberg

Title

EVP of Business Development

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.



Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Ex. 1005.0132

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: John Douglas Steinberg
App. No	: 15/616,719
Filed	: June 7, 2017
For	: SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
Examiner	: Unknown
Art Unit	: 3744

RESCISSION OF ANY PRIOR DISCLAIMERS AND REQUEST TO REVISIT ART

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The claims of the present application are different and possibly broader in scope than any pending claims in any related application or issued claims in any related patent. In particular, in one or more parent applications, including U.S. Patent Application No. 12/788,246, now U.S. Patent No. 8,556,188, issued October 15, 2013; U.S. Patent Application No. 14/048,932, now U.S. Patent No. 8,840,033, issued September 23, 2014; and U.S. Patent Application No. 14/491,554, now U.S. Patent No. 9,709,292, issued July 18, 2017; Applicant amended claims and received allowance over at least U.S. Patent Nos. 8,386,082; 8,428,782; and U.S. Publication No. 2011/0202181.

To the extent that any amendments or characterizations of the scope of any claim or referenced art could be construed as a disclaimer of any subject matter supported by the present disclosure, Applicant hereby rescinds and retracts such

Appl. No. : 15/616,719
Filed : June 7, 2017

Docket No. EFACT.012C3
Customer No. 20,995

disclaimer. Accordingly, the above-listed references, or other listed or referenced art may need to be re-visited. To this end, Applicant would appreciate acknowledgement of such reconsideration by Examiner initialization of at least the references listed in the attached Information Disclosure Statement Form PTO/SB/08.

In addition, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

Respectfully submitted,
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: August 14, 2017

By: John R. King
John R. King
Registration No. 34,362
Attorney of Record
Customer No. 20,995
(949) 760-0404

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081417

INFORMATION DISCLOSURE STATEMENT

First Inventor	: John Douglas Steinberg
App. No.	: 15/616,719
Filed	: June 7, 2017
For	: SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
Examiner	: Unknown
Art Unit	: 3744
Conf. No.	: 1263

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

References and Listing

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. References numbered 1-296 and 298-299 are of record in U.S. Patent Application No. 14/491,554, filed September 19, 2014, which is relied upon for an earlier filing date under 35 USC 120. Accordingly, copies of references numbered 1-296 and 298-299 are not submitted pursuant to 37 CFR 1.98(d).

No Disclaimers

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

Timing of Disclosure

This Information Disclosure Statement is being filed before the receipt of a First Office Action on the merits, and presumably no fee is required.

Application No.: 15/616719
Filing Date: June 7, 2017

If a First Office Action on the merits was mailed before the mailing date of this Statement, the Commissioner is authorized to charge the fee set forth in 37 CFR 1.17(p) to Deposit Account No. 11-1410.

Respectfully submitted,
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: August 14, 2017

By: /John R. King/
John R. King
Registration No. 34,362
Registered Practitioner
Customer No. 20,995
(949) 760-0404

26497456

INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 1 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	H2176	12/05/2006	Meyer et al.	
	2	12/805705	06/10/2010	Crabtree	
	3	13/470074	08/30/2012	Steinberg	
	4	13/523697	06/14/2012	Hublou et al.	
	5	13/725447	06/06/2013	Steinberg	
	6	13/729401	12/28/2012	Sloop	
	7	13/852577	03/28/2013	Steinberg et al.	
	8	13/858710	09/05/2013	Steinberg et al.	
	9	13/861189	04/11/2013	Steinberg et al.	
	10	14/082,675 (EFACT.007C1)	11/18/2003	Steinberg et al.	
	11	14/263,762	04/28/2014	Steinberg	
	12	14/285,384	05/22/2014	Steinberg, et al.	
	13	14/292,377	05/30/2014	Steinberg	
	14	14/491,554	09/19/2014	Steinberg	
	15	14/527,433	10/29/2014	Steinberg, et al.	
	16	14/731,221	06/04/2015	Steinberg, et al.	
	17	15/616719	06/07/2017	Steinberg, et al.	
	18	D 646,990	10/18/2011	Rhodes	
	19	D 659,560	05/15/2012	Rhodes	
	20	D 673,467	01/01/2013	Lee et al.	
	21	D 705,095 (EFACT.015DA)	05/20/2014	Steinberg et al.	
	22	4,136,732	01/30/1979	Demaray et al.	
	23	4,341,345	07/27/1982	Hammer et al.	
	24	4,403,644	09/13/1983	Hebert	
	25	4,451,879	05/29/1984	Welch et al.	
	26	4,475,685	10/09/1984	Grimado et al.	
	27	4,655,279	04/07/1987	Harmon	
	28	4,674,027	06/16/1987	Beckey	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T¹ - Place a check mark in this area when an English language Translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 2 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	29	4,675,828	06/23/1987	Winston	
	30	4,897,798	01/30/1990	Cler	
	31	5,124,502	06/23/1992	Nelson et al.	
	32	5,244,146	09/14/1993	Jefferson et al.	
	33	5,270,952	12/14/1993	Adams et al.	
	34	5,279,458	01/18/1994	Dewolf et al.	
	35	5,297,838	03/15/1994	Juravich	
	36	5,314,004	05/24/1994	Strand et al.	
	37	5,348,078	09/20/1994	Dushane et al.	
	38	5,462,225	10/31/1995	Massara et al.	
	39	5,544,036	08/06/1996	Brown et al.	
	40	5,555,927	09/17/1996	Shah	
	41	5,572,438	11/05/1996	Ehlers et al.	
	42	5,682,949	11/04/1997	Ratcliffe et al.	
	43	5,706,190	01/06/1998	Russ et al.	
	44	5,717,609	02/10/1998	Packa et al.	
	45	5,725,148	03/10/1998	Hartman	
	46	5,729,474	03/17/1998	Hildebrand et al.	
	47	5,818,347	10/06/1998	Dolan et al.	
	48	5,839,654	11/24/1998	Weber	
	49	5,977,964	11/02/1999	Williams et al.	
	50	6,079,626	06/27/2000	Hartman	
	51	6,115,713	09/05/2000	Pascucci et al.	
	52	6,145,751	11/14/2000	Ahmed	
	53	6,178,362	01/23/2001	Woolard et al.	
	54	6,260,765	07/17/2001	Natale et al.	
	55	6,241,156	06/05/2001	Kline et al.	
	56	6,351,693	02/26/2002	Monie	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T¹ - Place a check mark in this area when an English language Translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 3 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	57	6,400,956	06/02/2002	Richton	
	58	6,400,996	06/04/2002	Hoffberg et al.	
	59	6,437,692	08/20/2002	Petite et al.	
	60	6,454,177	09/24/2002	Sasao et al.	
	61	6,478,233	11/12/2002	Shah	
	62	6,480,803	11/12/2002	Pierret et al.	
	63	6,483,906	11/19/2002	Lggulden et al.	
	64	6,536,675	03/25/2003	Pesko et al.	
	65	6,542,076	04/01/2003	Joao	
	66	6,549,130	04/15/2003	Joao	
	67	6,574,537	06/02/2003	Kipersztok et al.	
	68	6,580,950	06/17/2003	Johnson	
	69	6,594,825	07/15/2003	Goldschmidtiki et al.	
	70	6,595,430	07/22/2003	Shah	
	71	6,598,056	07/22/2003	Hull et al.	
	72	6,619,555	09/16/2003	Rosen	
	73	6,622,097	09/16/2003	Hunter	
	74	6,622,115	09/16/2003	Brown et al.	
	75	6,622,925	09/23/2003	Carner et al.	
	76	6,622,926	09/23/2003	Sartain et al.	
	77	6,628,997	09/30/2003	Fox et al.	
	78	6,633,823	10/14/2003	Bartone et al.	
	79	6,643,567	11/04/2003	Kolk et al.	
	80	6,644,098	11/11/2003	Cardinale et al.	
	81	6,671,586	12/30/2003	Davis et al.	
	82	6,695,218	02/24/2004	Fleckenstein	
	83	6,700,224	03/02/2004	Biskup, Sr.,	
	84	6,726,113	04/27/2004	Guo	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T¹ - Place a check mark in this area when an English language Translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 4 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	85	6,731,992	05/04/2004	Ziegler	
	86	6,734,806	05/11/2004	Cratsley	
	87	6,772,052	08/03/2004	Amundsen	
	88	6,785,592	08/31/2004	Smith	
	89	6,785,630	08/31/2004	Kolk	
	90	6,786,421	09/07/2004	Rosen	
	91	6,789,739	09/14/2004	Rosen	
	92	6,845,918	01/25/2005	Rotondo	
	93	6,853,959	02/08/2005	Ikeda et al.	
	94	6,868,293	03/15/2005	Schurr	
	95	6,868,319	03/15/2005	Kipersztok et al.	
	96	6,882,712	04/19/2005	Iggulden et al.	
	97	6,889,908	05/10/2005	Crippen et al.	
	98	6,891,838	05/10/2005	Petite et al.	
	99	6,912,429	06/28/2005	Bilger	
	100	6,991,029	01/31/2006	Orfield et al.	
	101	7,009,493	03/07/2006	Howard	
	102	7,031,880	04/18/2006	Seem et al.	
	103	7,039,532	05/02/2006	Hunter	
	104	7,061,393	06/13/2006	Buckingham et al.	
	105	7,089,088	08/08/2006	Terry et al.	
	106	7,130,719	10/31/2006	Ehlers et al.	
	107	7,130,832	10/31/2006	Bannai et al.	
	108	7,167,079	01/23/2007	Smyth et al.	
	109	7,187,986	03/06/2007	Johnson et al.	
	110	7,205,892	04/17/2007	Luebke et al.	
	111	7,206,670	04/17/2007	Pimputkar, et al.	
	112	7,215,746	05/08/2007	Iggulden et al.	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 5 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	113	7,216,015	05/08/2007	Poth Robert J.	
	114	7,231,424	06/11/2007	Bodin et al.	
	115	7,232,075	06/19/2007	Rosen	
	116	7,242,988	07/10/2007	Hoffberg et al.	
	117	7,260,823	08/21/2007	Schlack et al.	
	118	7,356,384	04/08/2008	Gull et al.	
	119	7,476,020	01/13/2009	Zufferey et al.	
	120	7,483,964	01/27/2009	Jackson et al.	
	121	7,590,469	09/15/2009	Grohman	
	122	7,644,869	01/12/2010	Hoglund et al.	
	123	7,702,424	04/20/2010	Cannon et al.	
	124	7,758,729	07/20/2010	DeWhitt	
	125	7,784,704	08/31/2010	Harter	
	126	7,848,900 (EFACT.005A)	12/07/2010	Steinberg et al.	
	127	7,869,904	01/11/2011	Cannon et al.	
	128	7,894,943	02/22/2011	Sloup et al.	
	129	7,908,116 (EFACT.004A)	03/15/2011	Steinberg et al.	
	130	7,908,117 (EFACT.003A)	03/15/2011	Steinberg et al.	
	131	7,983,795	07/19/2011	Josephson et al.	
	132	8,010,237 (EFACT.010A)	08/30/2011	Cheung Leo et al.	
	133	8,019,567 (EFACT.006A)	09/13/2011	Steinberg et al.	
	134	8,090,477 (EFACT.013A)	01/03/2012	Steinberg	
	135	8,131,497 (EFACT.005C1)	03/06/2012	Steinberg et al.	
	136	8,131,506 (EFACT.004C1)	03/06/2012	Steinberg et al.	
	137	8,180,492 (EFACT.011A)	05/15/2012	Steinberg	
	138	8,340,826 (EFACT.013C1)	12/25/2012	Steinberg et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 6 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	139	8,412,488 (EFACT.004C2)	04/02/2013	Steinberg et al.	
	140	8,423,322 (EFACT.006C1)	04/16/2013	Steinberg et al.	
	141	8,428,782	04/23/2013	Imes	
	142	8,428,785	04/23/2013	Boucher et al.	
	143	8,457,797	06/04/2013	Imes et al.	
	144	8,498,753 (EFACT.009A)	07/30/2013	Steinberg et al.	
	145	8,556,188 (EFACT.012A)	10/15/2013	Steinberg	
	146	8,596,550 (EFACT.007A)	12/03/2013	Steinberg et al.	
	147	8,712,590 (EFACT.013C2)	04/29/2014	Steinberg	
	148	8,738,327 (EFACT.004C3)	05/27/2014	Steinberg, et al.	
	149	8,740,100 (EFACT.008A)	06/03/2014	Steinberg	
	150	8,751,186 (EFACT.005C3)	06/10/2014	Steinberg, et al.	
	151	8,840,033 (EFACT.012C1)	09/23/2014	Steinberg	
	152	8,850,348	09/30/2014	Fadell et al.	
	153	8,886,488 (EFACT.005C2)	11/11/2014	Steinberg, et al.	
	154	9,057,649 (EFACT.006C2)	06/16/2015	Steinberg, et al.	
	155	9,134,710 (EFACT.010C1)	09/15/2015	Cheung et al.	
	156	9,194,597 (EFACT.007C1)	11/24/2015	Steinberg, et al.	
	157	9,244,470 (EFACT.011C1)	01/26/2016	Steinberg	
	158	9,279,594 (EFACT.008C1)	03/08/2016	Steinberg	
	159	9,709,292 (EFACT.012C2)	07/18/2017	Steinberg	
	160	2003/0040934	02/27/2003	Skidmore et al.	
	161	2004/0065095	04/08/2004	Osborne et al.	
	162	2004/0117330	06/17/2004	Ehlers et al.	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 7 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	163	2004/0133314	07/08/2004	Ehlers et al.	
	164	2004/0176880	09/09/2004	Obradovich et al.	
	165	2005/0222889	10/06/2005	Lai et al.	
	166	2005/0288822	12/29/2005	Rayburn	
	167	2006/0045105	03/02/2006	Dobosz et al.	
	168	2006/0214014	09/28/2006	Bash et al.	
	169	2006/0283965	12/21/2006	Mueller et al.	
	170	2007/0043477	02/22/2007	Elhers et al.	
	171	2007/0045431	03/03/2007	Chapman et al.	
	172	2007/0146126	06/28/2007	Wang	
	173	2008/0083234	04/10/2008	Krebs et al.	
	174	2008/0083834	04/10/2008	Krebs et al.	
	175	2008/0198549	08/21/2008	Rasmussen et al.	
	176	2008/0281472	11/13/2008	Podgorny et al.	
	177	2009/0005070	01/01/2009	Forstall et al.	
	178	2009/0052859	02/26/2009	Greenberger et al.	
	179	2009/0057426	03/05/2009	Sullivan et al.	
	180	2009/0065596	03/12/2009	Seem et al.	
	181	2009/0099699	04/16/2009	Steinberg et al.	
	182	2009/0125151	05/14/2009	Steinberg et al.	
	183	2009/0188985	07/30/2009	Scharing et al.	
	184	2009/0240381	09/24/2009	Lane	
	185	2009/0281667	11/12/2009	Masui et al.	
	186	2010/0019052	01/28/2010	Yip	
	187	2010/0070086	03/18/2010	Harrod et al.	
	188	2010/0070089	03/18/2010	Harrod et al.	
	189	2010/0070093	03/18/2010	Harrod et al.	
	190	2010/0156608	06/24/2010	BAE et al.	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 8 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	191	2010/0162285	06/24/2010	Cohen et al.	
	192	2010/0211224	08/19/2010	Keeling et al.	
	193	2010/0235004	09/16/2010	Thind	
	194	2010/0289643	11/18/2010	Trundle et al.	
	195	2010/0318227	12/16/2010	Steinberg et al.	
	196	2011/0031323	02/10/2011	Nold et al.	
	197	2011/0046792	02/24/2011	Imes et al.	
	198	2011/0046798	02/24/2011	Imes et al.	
	199	2011/0046799	02/24/2011	Imes et al.	
	200	2011/0046800	02/24/2011	Imes et al.	
	201	2011/0046801	02/24/2011	Imes et al.	
	202	2011/0051823	03/03/2011	Imes et al.	
	203	2011/0054699	03/03/2011	Imes et al.	
	204	2011/0054710	03/03/2011	Imes et al.	
	205	2011/0173542	07/14/2011	Imes et al.	
	206	2011/0202185	08/18/2011	Imes et al.	
	207	2011/0214060	09/01/2011	Imes et al.	
	208	2011/0224838	09/15/2011	Imes et al.	
	209	2011/0246898	10/06/2011	Imes et al.	
	210	2011/0253796	10/20/2011	Posa et al.	
	211	2011/0290893	12/01/2011	Steinberg	
	212	2011/0307101	12/15/2011	Imes et al.	
	213	2012/0023225	01/26/2012	Imes et al.	
	214	2012/0046859	02/23/2012	Imes et al.	
	215	2012/0064923	03/15/2012	Imes et al.	
	216	2012/0065935	03/15/2012	Steinberg et al.	
	217	2012/0072033	03/22/2012	Imes et al.	
	218	2012/0086562	04/12/2012	Steinberg	

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	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 9 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	219	2012/0093141	04/19/2012	Imes et al.	
	220	2012/0101637	04/26/2012	Imes et al.	
	221	2012/0135759	05/31/2012	Imes et al.	
	222	2012/0186774	07/26/2012	Matsuoka et al.	
	223	2012/0215725	08/23/2012	Imes et al.	
	224	2012/0221718	08/30/2012	Imes et al.	
	225	2012/0252430	10/04/2012	Imes et al.	
	226	2012/0324119	12/20/2012	Imes et al.	
	227	2013/0053054	02/28/2013	Lovitt et al.	
	228	2013/0054758	02/28/2013	Imes et al.	
	229	2013/0054863	02/28/2013	Imes et al.	
	230	2013/0060387	03/07/2013	Imes et al.	
	231	2013/0073094	03/21/2013	Knapton et al.	
	232	2013/0144453	06/06/2013	Subbloie	
	233	2013/0167035	06/27/2013	Imes et al.	
	234	2013/0173064	07/04/2013	Fadell et al.	
	235	2013/0178985	07/11/2013	Lombard et al.	
	236	2013/0226502 EFACT.006C2	08/29/2013	Steinberg, et al.	
	237	2013/0310989 (EFACT.009C1)	11/21/2013	Steinberg et al.	
	238	2013/0338837 (EFACT.014A)	12/19/2013	Hublou et al.	
	239	2014/0039690 (EFACT.012C1)	02/06/2014	Steinberg	
	240	2014/0058567	02/27/2014	Matsuoka et al.	
	241	2014/0229018 (EFACT.013C3)	08/20/2014	Steinberg	
	242	2014/0316581	10/26/2014	Fadell et al.	
	243	2015/0025691	01/22/2015	Fadell et al.	
	244	2015/0043615 (EFACT.004C4)	02/12/2015	Steinberg et al.	
	245	2015/0120235 (EFACT.005C4)	04/30/2015	Steinberg et al.	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
<i>(Multiple sheets used when necessary)</i>	Examiner	Unknown
SHEET 10 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	246	2015/0142180	05/21/2015	Matsuoka et al.	
	247	2016/0061474 (EFACT.010C2)	03/03/2016	Cheung et al.	
	248	2016/0091219 (EFACT.007C2)	03/31/2016	Steinberg et al.	
	249	2016/0097557 (EFACT.013C4)	04/07/2016	Steinberg	
	250	2016/0138822 (EFACT.011C2)	05/19/2016	Steinberg	
	251	2016/0238270	08/18/2016	Steinberg	
	252	2016/0258822	09/08/2016	Steinberg et al.	
	253	2016/0363337	12/15/2016	Steinberg et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T ¹
	254	EP 0415747 A2	03/06/1991	Shaw et al.		
	255	JP 05-189659	07/30/1993	Hitachi Bill Shisetsu Eng. KK.		
	256	JP 2010-038377	02/18/2010	Mitsubishi Heavy Ind. Ltd.		
	257	JP 2010-286218	12/24/2010	Mitsubishi Heavy Ind. Ltd.		
	258	KR 10-1994-0011902	06/22/1994	Koryo Digital Elect. Co.		
	259	KR 10-1999-0070368	09/15/1999	Samsung Electronics Co. Ltd.		
	260	KR 10-2000-0059532	10/05/2000	Dang Hae System Co.		
	261	WO 2005/098331 A1	10/20/2005	Zip Ind Aust Pty Ltd.		
	262	WO 2011/149600 (EFACT.012WO)	12/01/2011	EcoFactor, Inc.		
	263	WO 2012/024534 (EFACT.013WO)	02/23/2012	EcoFactor, Inc.		
	264	WO 2013/187996	12/19/2013	EcoFactor, Inc.		

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹

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	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 11 OF 12	Attorney Docket No.	EFACT.012C3

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹
	265	ARENS, et al., "How Ambient Intelligence Will Improve Habitability and Energy Efficiency in Buildings", 2005, research paper, Center for the Built Environment, Controls and Information Technology.	
	266	BOURHAN, et al., "Cynamic model of an HVAC system for control analysis", Elsevier 2004.	
	267	BRUSH, et al., Preheat – Controlling Home Heating with Occupancy Prediction, 2013.	
	268	CHENG et al., "Smart Sensors Enable Smart Air Conditioning Control", Sensors 2014, ISSN 1424-8220, June 24, 2014, 25 pages.	
	269	Comverge SuperStat Flyer, prior to June 28, 2007.	
	270	Control4 Wireless Thermostat Brochure, 2006.	
	271	Cooper Power Systems Web Page, 2000-2009.	
	272	Emerson Climate Technologies, "Network Thermostat for E2 Building Controller Installation and Operation Manual", 2007.	
	273	Enernoc Web Page, 2004-2009.	
	274	Enerwise Website, 1999-2009.	
	275	Gupta, Adding GPS-Control to Traditional Thermostats: An Exploration of Potential Energy Savings and Design Challenges, MIT, 2009.	
	276	GUNES et al., "Improving Energy Efficiency and Thermal Comfort of Smart Buildings with HVAC Systems in the Presence of Sensor Faults", IEEE, August 24-26, 2015, 6 pages.	
	277	GUPTA, et al., A Persuasive GPS-Controlled Thermostat System, MIT, 2008.	
	278	Honeywell Programmable Thermostat Owner's Guide, www.honeywell.com/yourhome, 2004.	
	279	Honeywell, "W7600/W7620 Controller Reference Manual, HW0021207, October, 1992.	
	280	JOHNSON CONTROLS, "T600HCx-3 Single-Stage Thermostats", 2006.	
	281	JOHNSON CONTROLS, Touch4 building automation system brochure, 2007.	
	282	KILICOTTE, et al., "Dynamic Controls for Energy Efficiency and Demand Response: Framework Concepts and a New Construction Study Case in New York", Proceedings of the 2006 ACEEE Summer Study of Energy Efficiency in Buildings, Pacific Grove, CA, August 13-18, 2006	

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	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 12 OF 12	Attorney Docket No.	EFACT.012C3

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹
	283	KRUMM, et al., Learning Time-Based Presence Probabilities, June 2011.	
	284	LIN, et al., "Multi-Sensor Single-Actuator Control of HVAC Systems", 2002.	
	285	PIER, Southern California Edison, Demand Responsive Control of Air Conditioning via Programmable Communicating Thermostats Draft Report, February 14, 2006.	
	286	Proliphix Thermostat Brochure, prior to June 2007.	
	287	RAJI, "Smart Networks for Control", IEEE Spectrum, June 1994.	
	288	SCOTT, et al., Home Heating Using GPS-Based Arrival Prediction, 2010.	
	289	SIMMINI et al., Energy Efficient Control and Fault Detection for HVAC Systems, Univ. of Padova, XXVI Series, 2014, 144 pages.	
	290	SKLAVOUNOS, "Detection of Abnormal Situations and Energy Efficiency Control in Heating Ventilation and Air Conditioning (HVAC) Systems", Brunel University thesis, September 2015, 151 pages.	
	291	WANG, et al., "Opportunities to Save Energy and Improve Comfort by Using Wireless Sensor Networks in Buildings," (2003), Center for Environmental Design Research.	
	292	WETTER, et al., A comparison of deterministic and probabilistic optimization algorithms for nonsmooth simulation-based optimization, Building and Environment 39, 2004, Pages 989-999.	
	293	Written Opinion and Search Report for PCT/US2011/032537, dated 12/12/11 (our reference EFACT.012WO).	
	294	Office Action in Canadian Application No. 2800491 dated December 7, 2016 EFACT.012CA).	
	295	International Search Report and Written Opinion for PCT/US2013/035726 (EFACT.014WO), dated 08/06/2013.	
	296	International Preliminary Report on Patentability in PCT/US2013/035726 dated 12/16/2014 (EFACT.014WO).	
	297	Extended Search Report for European Application No. 11818805.1 dated June 9, 2017 (EFACT.013EP).	
	298	Extended Search Report for European Application No. 13804057.1 dated June 1, 2016 (EFACT.014EP).	
	299	Examination Report in Australian Application No. 2013274827 dated April 11, 2017 (EFACT.014AU).	

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Electronic Patent Application Fee Transmittal				
Application Number:		15616719		
Filing Date:		07-Jun-2017		
Title of Invention:		SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM		
First Named Inventor/Applicant Name:		John Douglas Steinberg		
Filer:		John R. King/Amy Durrant		
Attorney Docket Number:		EFACT.012C3		
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	70	70
UTILITY SEARCH FEE	2111	1	300	300
UTILITY EXAMINATION FEE	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	70	70
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				800

Electronic Acknowledgement Receipt	
EFS ID:	30071089
Application Number:	15616719
International Application Number:	
Confirmation Number:	1263
Title of Invention:	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
First Named Inventor/Applicant Name:	John Douglas Steinberg
Customer Number:	20995
Filer:	John R. King/Sandra Autry
Filer Authorized By:	John R. King
Attorney Docket Number:	EFACT.012C3
Receipt Date:	14-AUG-2017
Filing Date:	07-JUN-2017
Time Stamp:	15:55:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$800
RAM confirmation Number	081517INTEFSW15564900
Deposit Account	111410
Authorized User	Sandra Autry
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	EFACT-012C3_response.pdf	34525	no	1
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Information:					
2		EFACT-012C3_prelamend.pdf	376105	yes	10
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	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Preliminary Amendment		1	1	
	Claims		2	4	
	Applicant Arguments/Remarks Made in an Amendment		5	10	
Warnings:					
Information:					
3	Power of Attorney	EFACT-012C3_POA.pdf	123096	no	2
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Information:									
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Information:									
Total Files Size (in bytes):			1691676						
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.									

Please Direct All Correspondence to Customer Number 20,995

RESPONSE TO FORMALITIES NOTICE

Inventor	:	John Douglas Steinberg
App. No.	:	15/616,719
Filed	:	June 7, 2017
For	:	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
Art Unit	:	3744
Conf No.	:	1263

**Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450**

Dear Commissioner:

The above-captioned application was filed lacking at least one item that would advance the application to examination. Enclosed in compliance with 37 CFR 1.53(f) are the following:

- (X) Preliminary Amendment
- (X) Power of Attorney by Applicant.
- (X) Rescission of Prior Disclaimer and Request to Revisit Art.
- (X) Information Disclosure Statement.

The present application qualifies for small entity status under 37 CFR § 1.27.

- (X) Fees will be paid via EFS Web. Any extension of time will be requested by payment of the appropriate extension fee.

The Commissioner is hereby authorized to charge any additional fees which may be required, now or in the future, or credit any overpayment, to Account No. 11-1410.

Dated: August 14, 2017

By: /John R. King/
John R. King
Registration No. 34,362
Attorney of Record
Customer No. 20,995
(949) 760-0404

26497074



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/616,719	06/07/2017	3744	800	EFACT.012C3	20	2

CONFIRMATION NO. 1263

UPDATED FILING RECEIPT



000000093495376

20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 08/17/2017

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

John Douglas Steinberg, Millbrae, CA;

Applicant(s)

EcoFactor, Inc., Redwood City, CA;

Power of Attorney: The patent practitioners associated with Customer Number 20995

Domestic Priority data as claimed by applicant

This application is a CON of 14/491,554 09/19/2014 PAT 9709292
which is a CON of 14/048,932 10/08/2013 PAT 8840033
which is a CON of 12/788,246 05/26/2010 PAT 8556188

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 06/14/2017

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/616,719**

Projected Publication Date: 11/23/2017

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM

Preliminary Class

236

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/616,719		
APPLICATION AS FILED - PART I								
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)	
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A		
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	300		N/A		
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A		
TOTAL CLAIMS (37 CFR 1.16(i))	20	minus 20 = *	x 40 =	0.00				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *	x 210 =	0.00				
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00				
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00				
			TOTAL	730		TOTAL		
* If the difference in column 1 is less than zero, enter "0" in column 2.								
APPLICATION AS AMENDED - PART II								
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =		x =	
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =		x =	
	Application Size Fee (37 CFR 1.16(s))							
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
				TOTAL ADD'L FEE			TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =		x =	
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =		x =	
	Application Size Fee (37 CFR 1.16(s))							
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
				TOTAL ADD'L FEE			TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.								



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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/616,719	06/07/2017	John Douglas Steinberg	EFACT.012C3

CONFIRMATION NO. 1263

POA ACCEPTANCE LETTER



20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 08/17/2017

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/14/2017.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/tnguyen/



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/616,719	06/07/2017	John Douglas Steinberg	EFACT.012C3

CONFIRMATION NO. 1263

PUBLICATION NOTICE



OC000000095664841

20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Title:SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM

Publication No.US-2017-0336090-A1

Publication Date:11/23/2017

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publicly available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <https://portal.uspto.gov/pair/PublicPair>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/616,719	06/07/2017	John Douglas Steinberg	EFACT.012C3	1263
20995 7590 08/01/2018 KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614 UNITED STATES OF AMERICA			EXAMINER NORMAN, MARC E	
			ART UNIT 3744	PAPER NUMBER
			NOTIFICATION DATE 08/01/2018	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jayna.cartee@knobbe.com
efiling@knobbe.com

Office Action Summary	Application No. 15/616,719	Applicant(s) STEINBERG, JOHN DOUGLAS	
	Examiner MARC NORMAN	Art Unit 3744	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 8/14/17.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 2-21 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 2-21 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) ☒ Notice of References Cited (PTO-892) | 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date ____. | 4) ☐ Other: ____. |

DETAILED ACTION

The present application is being examined under the pre-AIA first to invent provisions.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP

§§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 2-21 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 9,709,292 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because patented independent claims 1 and 11 disclose all of the limitations respective pending claims 2 and 12 regarding associating the mobile device with the structure, receiving the geographic location of the mobile device, predicting length of time, and adjusting the setpoint based on the predicted length of time to reach a desired temperature and the predicted length of time for a user of a mobile electronic device to reach the structure. Pending claims 2 and 12 appear to be a simple broadening of the patented claims.

Claims 2-21 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-22 of U.S. Patent No. 8,556,188 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because patented independent

claims 1 and 12 disclose all of the limitations respective pending claims 2 and 12 regarding associating the mobile device with the structure, receiving the geographic location of the mobile device, predicting length of time, and adjusting the setpoint based on a rate of temperature change and the predicted length of time for a user of a mobile electronic device to reach the structure. Pending claims 2 and 12 appear to be a simple broadening of the patented claims. Patented claims 1 and 12 further disclose the limitations of pending claims 3 and 13 the controls being based a characteristic of a location (i.e., distance from structure) where a user is stopped. Pending claims 4-11 and 14-21 are disclosed in patented claims 2, 4, 6-11, 13, 15, and 17-22, respectively.

Claims 2-21 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-22 of U.S. Patent No. 8,840,033 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because patented independent claims 1 and 12 disclose all of the limitations respective pending claims 2 and 12 regarding associating the mobile device with the structure, receiving the geographic location of the mobile device, predicting length of time, and adjusting the setpoint based on a rate of temperature change and the predicted length of time for a user of a mobile electronic device to reach the structure. Pending claims 2 and 12 appear to be a simple broadening of the patented claims. Patented claims 1 and 12 further disclose the limitations of pending claims 3 and 13 the controls being based a characteristic of a location (i.e., distance from structure) where a user is stopped. Pending claims 4-11 and 14-21 are disclosed in patented claims 2, 4, 6-11, 13, 15, and 17-22, respectively.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARC NORMAN whose telephone number is (571)272-4812. The examiner can normally be reached on Mon.-Fri., 8:30-5:00.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frantz Jules can be reached on 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MARC NORMAN/
Primary Examiner, Art Unit 3744

Notice of References Cited	Application/Control No. 15/616,719	Applicant(s)/Patent Under Reexamination STEINBERG, JOHN DOUGLAS	
	Examiner MARC NORMAN	Art Unit 3744	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-9,791,839 B2	10-2017	Matsuoka; Yoky	G05B15/02	1/1
	B	US-				
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Bibliographic Data

Application No: 15/616,719

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☒ No ☐ Met After Allowance

Verified and Acknowledged: /MARC E NORMAN/

Examiner's Signature

Initials

Title:

SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC
DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
06/07/2017	236	3744	EFACT.012C3
RULE			

APPLICANTS

EcoFactor, Inc., Redwood City, CA,

INVENTORS

John Douglas Steinberg Millbrae, CA, UNITED STATES

CONTINUING DATA

This application is a CON of 14491554 09/19/2014 PAT 9709292

14491554 is a CON of 14048932 10/08/2013 PAT 8840033

14048932 is a CON of 12788246 05/26/2010 PAT 8556188

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

06/14/2017

** SMALL ENTITY **

STATE OR COUNTRY

UNITED STATES

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Search Notes 	Application/Control No. 15616719	Applicant(s)/Patent Under Reexamination STEINBERG, JOHN DOUGLAS
	Examiner MARC NORMAN	Art Unit 3744

CPC- SEARCHED		
Symbol	Date	Examiner
F24F 11/0034, 006, 0086, 30, 46, 52, 58, 62; 2130/00, 10	7/3/18	MN
G05 23/1905, 1951D	7/3/18	MN
H04Q 9/00; 2209/40,84	7/3/18	MN
Y02D 70/00, 1222, 1224, 142, 144, 164	7/3/18	MN
H04W 4/02	7/3/18	MN

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search (see attached)	7/3/18	MN
Inventor name search	7/3/18	MN
Consulted prosecution history of parent cases	7/3/18	MN

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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<i>Index of Claims</i> 	Application/Control No. 15616719	Applicant(s)/Patent Under Reexamination STEINBERG, JOHN DOUGLAS
	Examiner MARC NORMAN	Art Unit 3744

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant
☐ CPA
☐ T.D.
☐ R.1.47

CLAIM		DATE									
Final	Original	07/05/2018									
	1	-									
	2	✓									
	3	✓									
	4	✓									
	5	✓									
	6	✓									
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	16	✓									
	17	✓									
	18	✓									
	19	✓									
	20	✓									
	21	✓									

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S2	24	(associat\$3 adj5 (mobile adj2 device) adj3 structure).clm.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 09:06
S3	1889	((geographic adj location) near5 (mobile adj2 device)).clm.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 09:08
S4	2	(predict\$3 adj2 length adj2 time adj4 temperature).clm.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 09:08
S5	49674	(adjust\$3 with temperature).clm.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 09:10
S6	2	S2 and S3 and S4 and S5	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 09:10
S7	4369	f24f11/0034,006,0086.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 10:05
S8	10292	f24f11/30,62.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 10:06
S9	1447	g05d23/1905,1951.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 10:10
S10	9916	h04q9/00.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 10:21
S11	34003	y02d70/00,1222,26,1224,142,144,164.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 10:44

S12	436	f24f2130/00,10.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 10:50
S13	3237	f24f11/46,52,58.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:01
S14	0	h04q92209/40,84.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:09
S15	2773	h04q2209/40,84.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:09
S16	36203	h04w4/02.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:13
S17	6671	temperature adj setpoint	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:14
S18	1100	S17 and ((mobile adj device) or phone or smartphone)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:14
S19	48023	time near5 (reach\$3 or attain\$3) near4 temperature	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:15
S20	190	S18 and S19	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:16
S21	703	adjust\$3 near4 S17	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:17
S22	195	S21 and ((mobile adj device) or phone or smartphone)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:17
S23	52	S22 and S19	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:17

S24	30	S23 and (location near4 user)	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:18
S25	26	S24 not ecofactor-\$.as.	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:34
S26	530	predict\$3 with S19	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:37
S27	19	S22 and S26	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/03 11:37
S28	34945	rate near4 temperature near4 change	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:46
S29	75701	(location near5 (mobile adj2 device))	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:47
S30	158	S28 and S29	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:47
S31	6681	temperature adj setpoint	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:48
S32	21172	temperature adj (setpoint or (set adj point))	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:49
S33	21	S30 and S32	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:49
S34	119	steinberg-john\$.in.	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:51
S35	16	S29 and S34	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:51

S36	16	S32 and S35	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:52
S37	15864	(predict\$3 with time with (reach\$3 or arriv\$3))	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:53
S38	18	S33 and S37	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:54
S39	2	S38 not S36	US- PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2018/07/05 09:54
S40	1	("9791839").PN.	US- PGPUB; USPAT; USOCR	OR	OFF	2018/07/05 10:17

7/ 5/ 2018 10:34:03 AM

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PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
SHEET 1 OF 12		Examiner
		Unknown
		Attorney Docket No.
		EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	H2176	12/05/2006	Meyer et al.	
	2	12/805705	06/10/2010	Crabtree	
	3	13/470074	08/30/2012	Steinberg	
	4	13/523697	06/14/2012	Hublou et al.	
	5	13/725447	06/06/2013	Steinberg	
	6	13/729401	12/28/2012	Sloop	
	7	13/852577	03/28/2013	Steinberg et al.	
	8	13/858710	09/05/2013	Steinberg et al.	
	9	13/861189	04/11/2013	Steinberg et al.	
	10	14/082,675 (EFACT.007C1)	11/18/2003	Steinberg et al.	
	11	14/263,762	04/28/2014	Steinberg	
	12	14/285,384	05/22/2014	Steinberg, et al.	
	13	14/292,377	05/30/2014	Steinberg	
	14	14/491,554	09/19/2014	Steinberg	
	15	14/527,433	10/29/2014	Steinberg, et al.	
	16	14/731,221	06/04/2015	Steinberg, et al.	
	17	15/616719	06/07/2017	Steinberg, et al.	
	18	D 646,990	10/18/2011	Rhodes	
	19	D 659,560	05/15/2012	Rhodes	
	20	D 673,467	01/01/2013	Lee et al.	
	21	D 705,095 (EFACT.015DA)	05/20/2014	Steinberg et al.	
	22	4,136,732	01/30/1979	Demaray et al.	
	23	4,341,345	07/27/1982	Hammer et al.	
	24	4,403,644	09/13/1983	Hebert	
	25	4,451,879	05/29/1984	Welch et al.	
	26	4,475,685	10/09/1984	Grimado et al.	
	27	4,655,279	04/07/1987	Harmon	
	28	4,674,027	06/16/1987	Beckey	

Examiner Signature /MARC E NORMAN/	Date Considered 07/05/2018
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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PTO/SB/08 Equivalent

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	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 2 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	29	4,675,828	06/23/1987	Winston	
	30	4,897,798	01/30/1990	Cler	
	31	5,124,502	06/23/1992	Nelson et al.	
	32	5,244,146	09/14/1993	Jefferson et al.	
	33	5,270,952	12/14/1993	Adams et al.	
	34	5,279,458	01/18/1994	Dewolf et al.	
	35	5,297,838	03/15/1994	Juravich	
	36	5,314,004	05/24/1994	Strand et al.	
	37	5,348,078	09/20/1994	Dushane et al.	
	38	5,462,225	10/31/1995	Massara et al.	
	39	5,544,036	08/06/1996	Brown et al.	
	40	5,555,927	09/17/1996	Shah	
	41	5,572,438	11/05/1996	Ehlers et al.	
	42	5,682,949	11/04/1997	Ratcliffe et al.	
	43	5,706,190	01/06/1998	Russ et al.	
	44	5,717,609	02/10/1998	Packa et al.	
	45	5,725,148	03/10/1998	Hartman	
	46	5,729,474	03/17/1998	Hildebrand et al.	
	47	5,818,347	10/06/1998	Dolan et al.	
	48	5,839,654	11/24/1998	Weber	
	49	5,977,964	11/02/1999	Williams et al.	
	50	6,079,626	06/27/2000	Hartman	
	51	6,115,713	09/05/2000	Pascucci et al.	
	52	6,145,751	11/14/2000	Ahmed	
	53	6,178,362	01/23/2001	Woolard et al.	
	54	6,260,765	07/17/2001	Natale et al.	
	55	6,241,156	06/05/2001	Kline et al.	
	56	6,351,693	02/26/2002	Monie	

Examiner Signature /MARC E NORMAN/	Date Considered 07/05/2018
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	Filing Date	June 7, 2017	
	First Named Inventor	John Douglas Steinberg	
	Art Unit	3744	
(Multiple sheets used when necessary)		Examiner	Unknown
SHEET 3 OF 12		Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	57	6,400,956	06/02/2002	Richton	
	58	6,400,996	06/04/2002	Hoffberg et al.	
	59	6,437,692	08/20/2002	Petite et al.	
	60	6,454,177	09/24/2002	Sasao et al.	
	61	6,478,233	11/12/2002	Shah	
	62	6,480,803	11/12/2002	Pierret et al.	
	63	6,483,906	11/19/2002	Lggulden et al.	
	64	6,536,675	03/25/2003	Pesko et al.	
	65	6,542,076	04/01/2003	Joao	
	66	6,549,130	04/15/2003	Joao	
	67	6,574,537	06/02/2003	Kipersztok et al.	
	68	6,580,950	06/17/2003	Johnson	
	69	6,594,825	07/15/2003	Goldschmidtiki et al.	
	70	6,595,430	07/22/2003	Shah	
	71	6,598,056	07/22/2003	Hull et al.	
	72	6,619,555	09/16/2003	Rosen	
	73	6,622,097	09/16/2003	Hunter	
	74	6,622,115	09/16/2003	Brown et al.	
	75	6,622,925	09/23/2003	Carner et al.	
	76	6,622,926	09/23/2003	Sartain et al.	
	77	6,628,997	09/30/2003	Fox et al.	
	78	6,633,823	10/14/2003	Bartone et al.	
	79	6,643,567	11/04/2003	Kolk et al.	
	80	6,644,098	11/11/2003	Cardinale et al.	
	81	6,671,586	12/30/2003	Davis et al.	
	82	6,695,218	02/24/2004	Fleckenstein	
	83	6,700,224	03/02/2004	Biskup, Sr.,	
	84	6,726,113	04/27/2004	Guo	

Examiner Signature	/MARC E NORMAN/	Date Considered	07/05/2018
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	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
SHEET 4 OF 12		Attorney Docket No. EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	85	6,731,992	05/04/2004	Ziegler	
	86	6,734,806	05/11/2004	Cratsley	
	87	6,772,052	08/03/2004	Amundsen	
	88	6,785,592	08/31/2004	Smith	
	89	6,785,630	08/31/2004	Kolk	
	90	6,786,421	09/07/2004	Rosen	
	91	6,789,739	09/14/2004	Rosen	
	92	6,845,918	01/25/2005	Rotondo	
	93	6,853,959	02/08/2005	Ikeda et al.	
	94	6,868,293	03/15/2005	Schurr	
	95	6,868,319	03/15/2005	Kipersztok et al.	
	96	6,882,712	04/19/2005	Iggulden et al.	
	97	6,889,908	05/10/2005	Crippen et al.	
	98	6,891,838	05/10/2005	Petite et al.	
	99	6,912,429	06/28/2005	Bilger	
	100	6,991,029	01/31/2006	Orfield et al.	
	101	7,009,493	03/07/2006	Howard	
	102	7,031,880	04/18/2006	Seem et al.	
	103	7,039,532	05/02/2006	Hunter	
	104	7,061,393	06/13/2006	Buckingham et al.	
	105	7,089,088	08/08/2006	Terry et al.	
	106	7,130,719	10/31/2006	Ehlers et al.	
	107	7,130,832	10/31/2006	Bannai et al.	
	108	7,167,079	01/23/2007	Smyth et al.	
	109	7,187,986	03/06/2007	Johnson et al.	
	110	7,205,892	04/17/2007	Luebke et al.	
	111	7,206,670	04/17/2007	Pimputkar, et al.	
	112	7,215,746	05/08/2007	Iggulden et al.	

Examiner Signature /MARC E NORMAN/	Date Considered 07/05/2018
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	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 5 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	113	7,216,015	05/08/2007	Poth Robert J.	
	114	7,231,424	06/11/2007	Bodin et al.	
	115	7,232,075	06/19/2007	Rosen	
	116	7,242,988	07/10/2007	Hoffberg et al.	
	117	7,260,823	08/21/2007	Schlack et al.	
	118	7,356,384	04/08/2008	Gull et al.	
	119	7,476,020	01/13/2009	Zufferey et al.	
	120	7,483,964	01/27/2009	Jackson et al.	
	121	7,590,469	09/15/2009	Grohman	
	122	7,644,869	01/12/2010	Hoglund et al.	
	123	7,702,424	04/20/2010	Cannon et al.	
	124	7,758,729	07/20/2010	DeWhitt	
	125	7,784,704	08/31/2010	Harter	
	126	7,848,900 (EFACT.005A)	12/07/2010	Steinberg et al.	
	127	7,869,904	01/11/2011	Cannon et al.	
	128	7,894,943	02/22/2011	Sloup et al.	
	129	7,908,116 (EFACT.004A)	03/15/2011	Steinberg et al.	
	130	7,908,117 (EFACT.003A)	03/15/2011	Steinberg et al.	
	131	7,983,795	07/19/2011	Josephson et al.	
	132	8,010,237 (EFACT.010A)	08/30/2011	Cheung Leo et al.	
	133	8,019,567 (EFACT.006A)	09/13/2011	Steinberg et al.	
	134	8,090,477 (EFACT.013A)	01/03/2012	Steinberg	
	135	8,131,497 (EFACT.005C1)	03/06/2012	Steinberg et al.	
	136	8,131,506 (EFACT.004C1)	03/06/2012	Steinberg et al.	
	137	8,180,492 (EFACT.011A)	05/15/2012	Steinberg	
	138	8,340,826 (EFACT.013C1)	12/25/2012	Steinberg et al.	

Examiner Signature	/MARC E NORMAN/	Date Considered	07/05/2018
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

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PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 6 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	139	8,412,488 (EFACT.004C2)	04/02/2013	Steinberg et al.	
	140	8,423,322 (EFACT.006C1)	04/16/2013	Steinberg et al.	
	141	8,428,782	04/23/2013	Imes	
	142	8,428,785	04/23/2013	Boucher et al.	
	143	8,457,797	06/04/2013	Imes et al.	
	144	8,498,753 (EFACT.009A)	07/30/2013	Steinberg et al.	
	145	8,556,188 (EFACT.012A)	10/15/2013	Steinberg	
	146	8,596,550 (EFACT.007A)	12/03/2013	Steinberg et al.	
	147	8,712,590 (EFACT.013C2)	04/29/2014	Steinberg	
	148	8,738,327 (EFACT.004C3)	05/27/2014	Steinberg, et al.	
	149	8,740,100 (EFACT.008A)	06/03/2014	Steinberg	
	150	8,751,186 (EFACT.005C3)	06/10/2014	Steinberg, et al.	
	151	8,840,033 (EFACT.012C1)	09/23/2014	Steinberg	
	152	8,850,348	09/30/2014	Fadell et al.	
	153	8,886,488 (EFACT.005C2)	11/11/2014	Steinberg, et al.	
	154	9,057,649 (EFACT.006C2)	06/16/2015	Steinberg, et al.	
	155	9,134,710 (EFACT.010C1)	09/15/2015	Cheung et al.	
	156	9,194,597 (EFACT.007C1)	11/24/2015	Steinberg, et al.	
	157	9,244,470 (EFACT.011C1)	01/26/2016	Steinberg	
	158	9,279,594 (EFACT.008C1)	03/08/2016	Steinberg	
	159	9,709,292 (EFACT.012C2)	07/18/2017	Steinberg	
	160	2003/0040934	02/27/2003	Skidmore et al.	
	161	2004/0065095	04/08/2004	Osborne et al.	
	162	2004/0117330	06/17/2004	Ehlers et al.	

Examiner Signature	/MARC E NORMAN/	Date Considered	07/05/2018
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PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 7 OF 12	Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	163	2004/0133314	07/08/2004	Ehlers et al.	
	164	2004/0176880	09/09/2004	Obradovich et al.	
	165	2005/0222889	10/06/2005	Lai et al.	
	166	2005/0288822	12/29/2005	Rayburn	
	167	2006/0045105	03/02/2006	Dobosz et al.	
	168	2006/0214014	09/28/2006	Bash et al.	
	169	2006/0283965	12/21/2006	Mueller et al.	
	170	2007/0043477	02/22/2007	Elhers et al.	
	171	2007/0045431	03/03/2007	Chapman et al.	
	172	2007/0146126	06/28/2007	Wang	
	173	2008/0083234	04/10/2008	Krebs et al.	
	174	2008/0083834	04/10/2008	Krebs et al.	
	175	2008/0198549	08/21/2008	Rasmussen et al.	
	176	2008/0281472	11/13/2008	Podgorny et al.	
	177	2009/0005070	01/01/2009	Forstall et al.	
	178	2009/0052859	02/26/2009	Greenberger et al.	
	179	2009/0057426	03/05/2009	Sullivan et al.	
	180	2009/0065596	03/12/2009	Seem et al.	
	181	2009/0099699	04/16/2009	Steinberg et al.	
	182	2009/0125151	05/14/2009	Steinberg et al.	
	183	2009/0188985	07/30/2009	Scharing et al.	
	184	2009/0240381	09/24/2009	Lane	
	185	2009/0281667	11/12/2009	Masui et al.	
	186	2010/0019052	01/28/2010	Yip	
	187	2010/0070086	03/18/2010	Harrod et al.	
	188	2010/0070089	03/18/2010	Harrod et al.	
	189	2010/0070093	03/18/2010	Harrod et al.	
	190	2010/0156608	06/24/2010	BAE et al.	

Examiner Signature <u>/MARC E NORMAN/</u>	Date Considered <u>07/05/2018</u>
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PTO/SB/08 Equivalent

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	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
SHEET 8 OF 12		Examiner
		Unknown
		Attorney Docket No.
		EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	191	2010/0162285	06/24/2010	Cohen et al.	
	192	2010/0211224	08/19/2010	Keeling et al.	
	193	2010/0235004	09/16/2010	Thind	
	194	2010/0289643	11/18/2010	Trundle et al.	
	195	2010/0318227	12/16/2010	Steinberg et al.	
	196	2011/0031323	02/10/2011	Nold et al.	
	197	2011/0046792	02/24/2011	Imes et al.	
	198	2011/0046798	02/24/2011	Imes et al.	
	199	2011/0046799	02/24/2011	Imes et al.	
	200	2011/0046800	02/24/2011	Imes et al.	
	201	2011/0046801	02/24/2011	Imes et al.	
	202	2011/0051823	03/03/2011	Imes et al.	
	203	2011/0054699	03/03/2011	Imes et al.	
	204	2011/0054710	03/03/2011	Imes et al.	
	205	2011/0173542	07/14/2011	Imes et al.	
	206	2011/0202185	08/18/2011	Imes et al.	
	207	2011/0214060	09/01/2011	Imes et al.	
	208	2011/0224838	09/15/2011	Imes et al.	
	209	2011/0246898	10/06/2011	Imes et al.	
	210	2011/0253796	10/20/2011	Posa et al.	
	211	2011/0290893	12/01/2011	Steinberg	
	212	2011/0307101	12/15/2011	Imes et al.	
	213	2012/0023225	01/26/2012	Imes et al.	
	214	2012/0046859	02/23/2012	Imes et al.	
	215	2012/0064923	03/15/2012	Imes et al.	
	216	2012/0065935	03/15/2012	Steinberg et al.	
	217	2012/0072033	03/22/2012	Imes et al.	
	218	2012/0086562	04/12/2012	Steinberg	

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PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
SHEET 9 OF 12		Attorney Docket No. EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	219	2012/0093141	04/19/2012	Imes et al.	
	220	2012/0101637	04/26/2012	Imes et al.	
	221	2012/0135759	05/31/2012	Imes et al.	
	222	2012/0186774	07/26/2012	Matsuoka et al.	
	223	2012/0215725	08/23/2012	Imes et al.	
	224	2012/0221718	08/30/2012	Imes et al.	
	225	2012/0252430	10/04/2012	Imes et al.	
	226	2012/0324119	12/20/2012	Imes et al.	
	227	2013/0053054	02/28/2013	Lovitt et al.	
	228	2013/0054758	02/28/2013	Imes et al.	
	229	2013/0054863	02/28/2013	Imes et al.	
	230	2013/0060387	03/07/2013	Imes et al.	
	231	2013/0073094	03/21/2013	Knapton et al.	
	232	2013/0144453	06/06/2013	Subbloie	
	233	2013/0167035	06/27/2013	Imes et al.	
	234	2013/0173064	07/04/2013	Fadell et al.	
	235	2013/0178985	07/11/2013	Lombard et al.	
	236	2013/0226502 EFACT.006C2	08/29/2013	Steinberg, et al.	
	237	2013/0310989 (EFACT.009C1)	11/21/2013	Steinberg et al.	
	238	2013/0338837 (EFACT.014A)	12/19/2013	Hublou et al.	
	239	2014/0039690 (EFACT.012C1)	02/06/2014	Steinberg	
	240	2014/0058567	02/27/2014	Matsuoka et al.	
	241	2014/0229018 (EFACT.013C3)	08/20/2014	Steinberg	
	242	2014/0316581	10/26/2014	Fadell et al.	
	243	2015/0025691	01/22/2015	Fadell et al.	
	244	2015/0043615 (EFACT.004C4)	02/12/2015	Steinberg et al.	
	245	2015/0120235 (EFACT.005C4)	04/30/2015	Steinberg et al.	

Examiner Signature /MARC E NORMAN/	Date Considered 07/05/2018
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	15/616719	
	Filing Date	June 7, 2017	
	First Named Inventor	John Douglas Steinberg	
	Art Unit	3744	
(Multiple sheets used when necessary)		Examiner	Unknown
SHEET 10 OF 12		Attorney Docket No.	EFACT.012C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	246	2015/0142180	05/21/2015	Matsuoka et al.	
	247	2016/0061474 (EFACT.010C2)	03/03/2016	Cheung et al.	
	248	2016/0091219 (EFACT.007C2)	03/31/2016	Steinberg et al.	
	249	2016/0097557 (EFACT.013C4)	04/07/2016	Steinberg	
	250	2016/0138822 (EFACT.011C2)	05/19/2016	Steinberg	
	251	2016/0238270	08/18/2016	Steinberg	
	252	2016/0258822	09/08/2016	Steinberg et al.	
	253	2016/0363337	12/15/2016	Steinberg et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document Country Code-Number-Kind Code Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T ¹
	254	EP 0415747 A2	03/06/1991	Shaw et al.		
	255	JP 05-189659	07/30/1993	Hitachi Bill Shisetsu Eng. KK.		
	256	JP 2010-038377	02/18/2010	Mitsubishi Heavy Ind. Ltd.		
	257	JP 2010-286218	12/24/2010	Mitsubishi Heavy Ind. Ltd.		
	258	KR 10-1994-0011902	06/22/1994	Koryo Digital Elect. Co.		
	259	KR 10-1999-0070368	09/15/1999	Samsung Electronics Co. Ltd.		
	260	KR 10-2000-0059532	10/05/2000	Dang Hae System Co.		
	261	WO 2005/098331 A1	10/20/2005	Zip Ind Aust Pty Ltd.		
	262	WO 2011/149600 (EFACT.012WO)	12/01/2011	EcoFactor, Inc.		
	263	WO 2012/024534 (EFACT.013WO)	02/23/2012	EcoFactor, Inc.		
	264	WO 2013/187996	12/19/2013	EcoFactor, Inc.		

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Multiple sheets used when necessary)</i>	Application No.	15/616719
	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
	Examiner	Unknown
SHEET 11 OF 12	Attorney Docket No.	EFACT.012C3

NON PATENT LITERATURE DOCUMENTS

Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹
	265	ARENS, et al., "How Ambient Intelligence Will Improve Habitability and Energy Efficiency in Buildings", 2005, research paper, Center for the Built Environment, Controls and Information Technology.	
	266	BOURHAN, et al., "Cynamic model of an HVAC system for control analysis", Elsevier 2004.	
	267	BRUSH, et al., Preheat – Controlling Home Heating with Occupancy Prediction, 2013.	
	268	CHENG et al., "Smart Sensors Enable Smart Air Conditioning Control", Sensors 2014, ISSN 1424-8220, June 24, 2014, 25 pages.	
	269	Comverge SuperStat Flyer, prior to June 28, 2007.	
	270	Control4 Wireless Thermostat Brochure, 2006.	
	271	Cooper Power Systems Web Page, 2000-2009.	
	272	Emerson Climate Technologies, "Network Thermostat for E2 Building Controller Installation and Operation Manual", 2007.	
	273	Enernoc Web Page, 2004-2009.	
	274	Enerwise Website, 1999-2009.	
	275	Gupta, Adding GPS-Control to Traditional Thermostats: An Exploration of Potential Energy Savings and Design Challenges, MIT, 2009.	
	276	GUNES et al., "Improving Energy Efficiency and Thermal Comfort of Smart Buildings with HVAC Systems in the Presence of Sensor Faults", IEEE, August 24-26, 2015, 6 pages.	
	277	GUPTA, et al., A Persuasive GPS-Controlled Thermostat System, MIT, 2008.	
	278	Honeywell Programmable Thermostat Owner's Guide, www.honeywell.com/yourhome, 2004.	
	279	Honeywell, "W7600/W7620 Controller Reference Manual, HW0021207, October, 1992.	
	280	JOHNSON CONTROLS, "T600HCx-3 Single-Stage Thermostats", 2006.	
	281	JOHNSON CONTROLS, Touch4 building automation system brochure, 2007.	
	282	KILICOTTE, et al., "Dynamic Controls for Energy Efficiency and Demand Response: Framework Concepts and a New Construction Study Case in New York", Proceedings of the 2006 ACEEE Summer Study of Energy Efficiency in Buildings, Pacific Grove, CA, August 13-18, 2006	

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	Filing Date	June 7, 2017
	First Named Inventor	John Douglas Steinberg
	Art Unit	3744
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 12 OF 12	Attorney Docket No.	EFACT.012C3

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ¹
	283	KRUMM, et al., Learning Time-Based Presence Probabilities, June 2011.	
	284	LIN, et al., "Multi-Sensor Single-Actuator Control of HVAC Systems", 2002.	
	285	PIER, Southern California Edison, Demand Responsive Control of Air Conditioning via Programmable Communicating Thermostats Draft Report, February 14, 2006.	
	286	Proliphix Thermostat Brochure, prior to June 2007.	
	287	RAJI, "Smart Networks for Control", IEEE Spectrum, June 1994.	
	288	SCOTT, et al., Home Heating Using GPS-Based Arrival Prediction, 2010.	
	289	SIMMINI et al., Energy Efficient Control and Fault Detection for HVAC Systems, Univ. of Padova, XXVI Series, 2014, 144 pages.	
	290	SKLAVOUNOS, "Detection of Abnormal Situations and Energy Efficiency Control in Heating Ventilation and Air Conditioning (HVAC) Systems", Brunel University thesis, September 2015, 151 pages.	
	291	WANG, et al., "Opportunities to Save Energy and Improve Comfort by Using Wireless Sensor Networks in Buildings," (2003), Center for Environmental Design Research.	
	292	WETTER, et al., A comparison of deterministic and probabilistic optimization algorithms for nonsmooth simulation-based optimization, Building and Environment 39, 2004, Pages 989-999.	
	293	Written Opinion and Search Report for PCT/US2011/032537, dated 12/12/11 (our reference EFACT.012WO).	
	294	Office Action in Canadian Application No. 2800491 dated December 7, 2016 EFACT.012CA).	
	295	International Search Report and Written Opinion for PCT/US2013/035726 (EFACT.014WO), dated 08/06/2013.	
	296	International Preliminary Report on Patentability in PCT/US2013/035726 dated 12/16/2014 (EFACT.014WO).	
	297	Extended Search Report for European Application No. 11818805.1 dated June 9, 2017 (EFACT.013EP).	
	298	Extended Search Report for European Application No. 13804057.1 dated June 1, 2016 (EFACT.014EP).	
	299	Examination Report in Australian Application No. 2013274827 dated April 11, 2017 (EFACT.014AU).	

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Examiner Signature	/MARC E NORMAN/	Date Considered	07/05/2018
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Please Direct All Correspondence to Customer Number 20,995

REQUEST FOR RETENTION OF APPLICATION

Inventor	:	John Douglas Steinberg
App. No	:	15/616,719
Filed	:	June 7, 2017
For	:	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
Examiner	:	Norman, Marc E.
Art Unit	:	3744
Conf No.	:	1263

Mail Stop Amendment

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

The above-referenced patent application is being maintained for the purpose of filing a continuing application. Fees due at this time are indicated below:

FEE CALCULATION			
FEE TYPE	37 CFR	FEE CODE	TOTAL
3 Month Extension	1.17(a)(3)	1253 (\$1,400)	\$1,400
SUB-TOTAL FEE DUE			\$1,400
The present application qualifies for Small Entity status under 37 CFR § 1.27. Fee reduced by 1/2.			(\$700)
TOTAL FEE DUE			\$700

Please Direct All Correspondence to Customer Number 20,995

- (X) Calculated Fees will be paid via EFS Web.
Extension of time is requested by payment of any extension fee.

Respectfully submitted,
KNOBBE MARTENS OLSON & BEAR LLP

Dated: January 31, 2019

By: John R. King
John R. King
Registration No. 34,362
Registered Practitioner
Customer No. 20,995

29859884

Electronic Patent Application Fee Transmittal				
Application Number:		15616719		
Filing Date:		07-Jun-2017		
Title of Invention:		SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM		
First Named Inventor/Applicant Name:		John Douglas Steinberg		
Filer:		John R. King/Amy Durrant		
Attorney Docket Number:		EFACT.012C3		
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 3 months with \$0 paid	2253	1	700	700
Miscellaneous:				
Total in USD (\$)				700

Electronic Acknowledgement Receipt	
EFS ID:	35021533
Application Number:	15616719
International Application Number:	
Confirmation Number:	1263
Title of Invention:	SYSTEM AND METHOD FOR USING A MOBILE ELECTRONIC DEVICE TO OPTIMIZE AN ENERGY MANAGEMENT SYSTEM
First Named Inventor/Applicant Name:	John Douglas Steinberg
Customer Number:	20995
Filer:	John R. King/Wendi Manzanares
Filer Authorized By:	John R. King
Attorney Docket Number:	EFACT.012C3
Receipt Date:	31-JAN-2019
Filing Date:	07-JUN-2017
Time Stamp:	16:50:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$700
RAM confirmation Number	020119INTEFSW16511200
Deposit Account	111410
Authorized User	Wendi Manzanares
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	EFACT-012C3_request.pdf	18425	no	2
			4f8a7bc982f1549e9537670f63f4f4830b0d1da5		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30970	no	2
			87bcf2b4e3022134ecb4520b813e2e2e09d5ab97		
Warnings:					
Information:					
Total Files Size (in bytes):			49395		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/616,719	06/07/2017	John Douglas Steinberg	EFACT.012C3	1263
20995 7590 03/05/2019 KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614			EXAMINER NORMAN, MARC E	
			ART UNIT 3763	PAPER NUMBER
			NOTIFICATION DATE 03/05/2019	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

efiling@knobbe.com
jayna.cartee@knobbe.com

<i>Notice of Abandonment</i>	Application No.	Applicant(s)
	15/616,719	Steinberg, John Douglas
	Examiner	Art Unit
	MARC E NORMAN	3763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on 01 August 2018.
 - (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
 - (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 to the final rejection. (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) if this is utility or plant application, a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. Note that RCEs are not permitted in design applications.)
 - (c) ☒ A reply was received on 31 January 2019 but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
 - (d) ☐ No reply has been received.
2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
 - (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
 - (b) ☐ The submitted fee of \$ _____ is insufficient. A balance of \$ _____ is due.
The issue fee required by 37CFR 1.18 is \$ _____. The publication fee, if required by 37 CFR 1.18(d), is \$ _____.
 - (c) ☐ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
 - (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
 - (b) ☐ No corrected drawings have been received.
4. ☐ The letter of express abandonment which is signed by the attorney or agent of record or other party authorized under 37 CFR 1.33 (b). See 37 CFR 1.138(b).
5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34) upon the filing of a continuing application.
6. ☐ The decision by the Board of Patent Appeals and Interference rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. ☒ The reason(s) below:

Applicant filed an Extension of Time in order to file a continuation, but did not file an actual response to the outstanding Office Action.

/MARC E NORMAN/ Primary Examiner, Art Unit 3763	
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Petitions to revive under 37 CFR 1.137, or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.