



(19) **United States**

(12) **Patent Application Publication**  
**Herring et al.**

(10) **Pub. No.: US 2015/0032265 A1**

(43) **Pub. Date: Jan. 29, 2015**

(54) **ENVIRONMENTAL CONDITION CONTROL AND MONITORING SYSTEMS AND METHODS**

**Publication Classification**

(71) Applicant: **Toshiba Global Commerce Solutions Holdings Corporation**, Tokyo (JP)

(51) **Int. Cl.**  
**F24F 11/00** (2006.01)

(72) Inventors: **Dean F. Herring**, Youngsville, NC (US);  
**Brad M. Johnson**, Raleigh, NC (US);  
**Jeffrey J. Smith**, Raleigh, NC (US)

(52) **U.S. Cl.**  
CPC ..... **F24F 11/0009** (2013.01)  
USPC ..... **700/276**

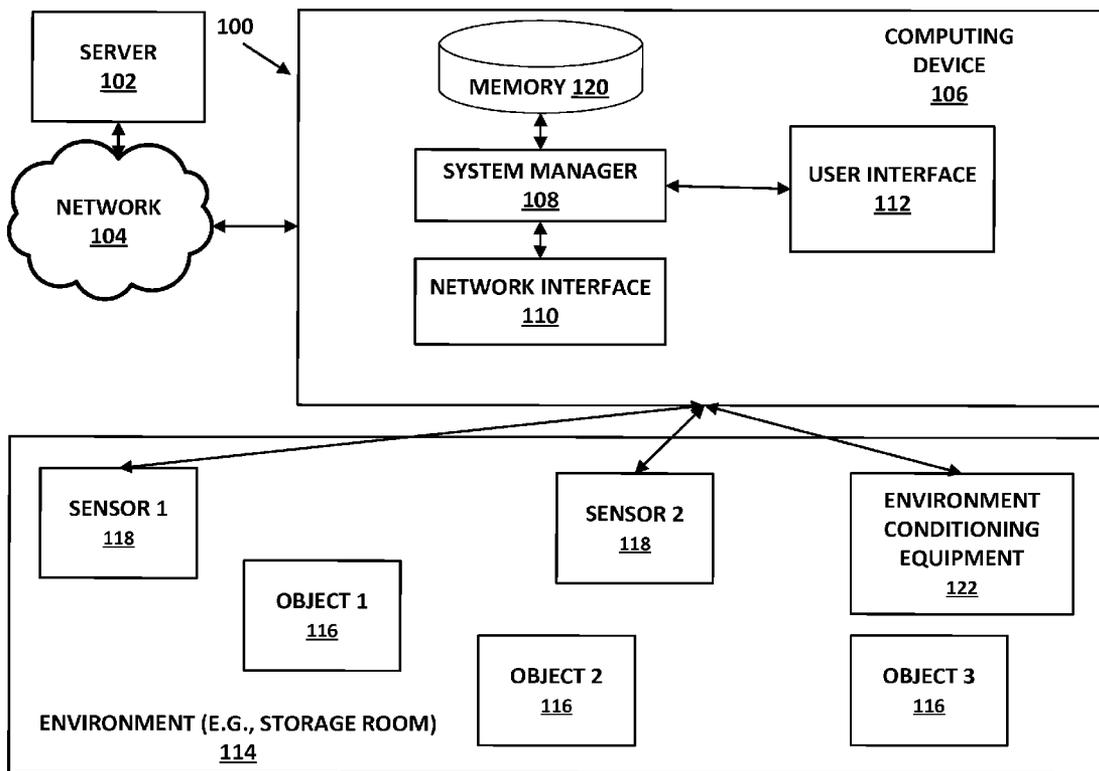
(73) Assignee: **Toshiba Global Commerce Solutions Holdings Corporation**, Tokyo (JP)

(57) **ABSTRACT**

Environmental condition control and monitoring systems and methods are disclosed herein. According to an aspect, a method includes determining a condition profile of an object. Further, the method includes identifying the object within an environment. The method also includes determining whether the environment meets a requirement defined by the condition profile of the object. The method also includes controlling environment conditioning equipment based on whether the environment meets the requirement.

(21) Appl. No.: **13/952,738**

(22) Filed: **Jul. 29, 2013**



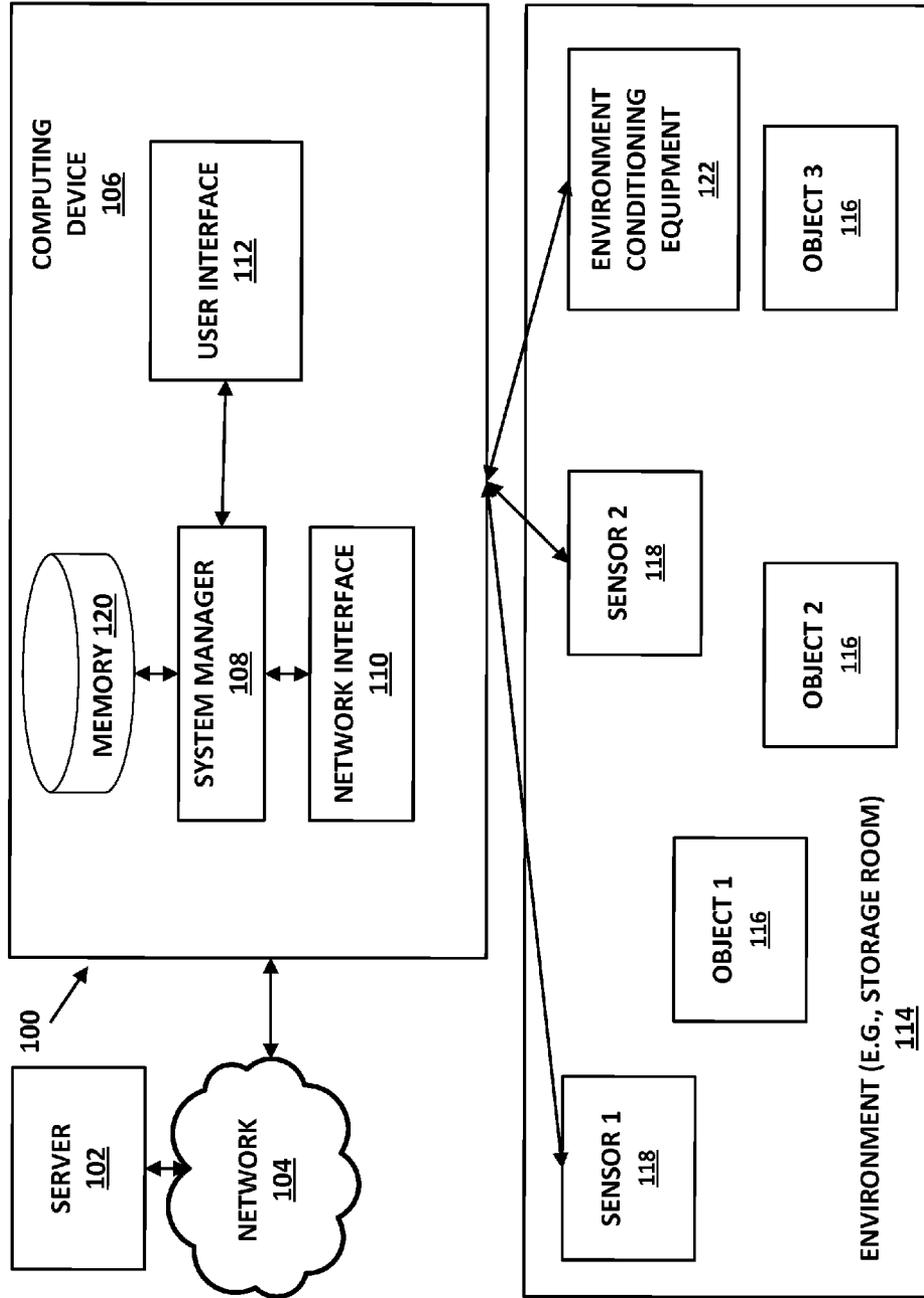


FIG. 1

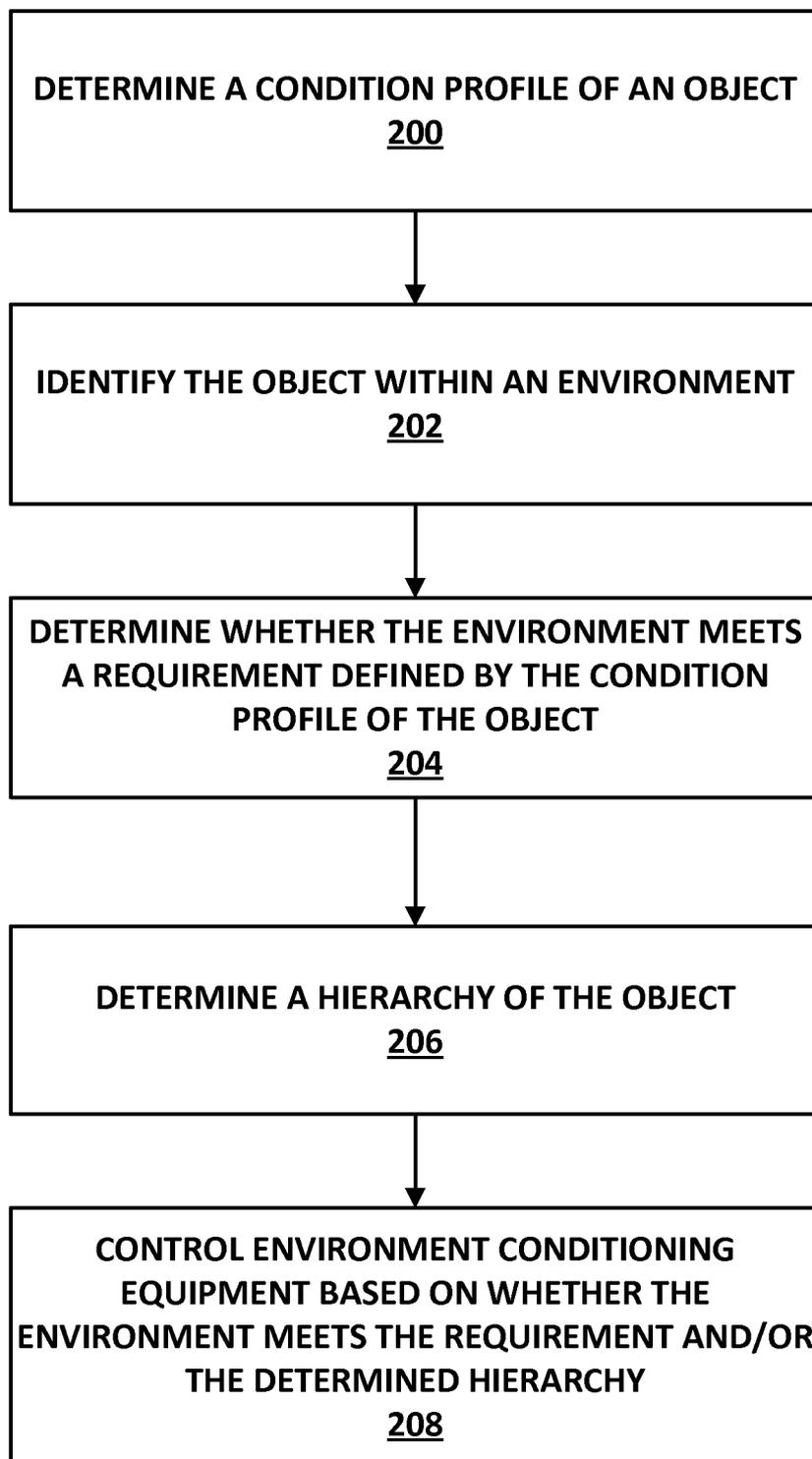


FIG. 2

**ENVIRONMENTAL CONDITION CONTROL AND MONITORING SYSTEMS AND METHODS**

**TECHNICAL FIELD**

[0001] The present invention relates to environmental condition control and monitoring systems and methods.

**BACKGROUND**

[0002] In various environments such as retail establishments, homes, offices, and storage facilities, it is desired to maintain conditions at a desired level. For example, in a storage area of a grocery store or other “brick and mortar” store, many food products must be maintained at a particular temperature. In another example, in a home, people desire to have the temperature within a preferred temperature range. In yet another example, a storage facility may include paper files or other objects that require a particular humidity and temperature. Environment conditioning equipment, such as air conditioners, heaters, and humidifiers, can be provided within these and other environments for controlling conditions to meet the needs of objects within the environments.

[0003] Some objects are more of a concern with ensuring that they are maintained at a particular environmental condition. For example, many food products, such as lobster or a dairy product, must be maintained within a particular temperature range from a facility where it originates, along a transportation route, in a storage room of a retail store, and until it is purchased by a consumer. In yet another example, many people have particular condition preferences, and it is desired to provide a system capable of recognizing their presence within an environment for adjusting conditions in accordance with their preference.

[0004] In view of the foregoing, it is desired to provide improved systems and techniques for controlling and monitoring environmental conditions based on objects within the environment.

**SUMMARY**

[0005] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

[0006] Disclosed herein are systems and methods for controlling and monitoring environmental conditions. According to an aspect, a method includes determining a condition profile of an object. Further, the method includes identifying the object within an environment. The method also includes determining whether the environment meets a requirement defined by the condition profile of the object. The method also includes controlling environment conditioning equipment based on whether the environment meets the requirement.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0007] The foregoing summary, as well as the following detailed description of various embodiments, is better understood when read in conjunction with the appended drawings. For the purposes of illustration, there is shown in the drawings exemplary embodiments; however, the presently disclosed subject matter is not limited to the specific methods and instrumentalities disclosed. In the drawings:

[0008] FIG. 1 is a block diagram of an example environmental condition control and monitoring system in accordance with embodiments of the present subject matter; and

[0009] FIG. 2 is a flowchart of an example method for environmental condition control and monitoring in accordance with embodiments of the present subject matter.

**DETAILED DESCRIPTION**

[0010] The presently disclosed subject matter is described with specificity to meet statutory requirements. However, the description itself is not intended to limit the scope of this patent. Rather, the inventors have contemplated that the claimed subject matter might also be embodied in other ways, to include different steps or elements similar to the ones described in this document, in conjunction with other present or future technologies. Moreover, although the term “step” may be used herein to connote different aspects of methods employed, the term should not be interpreted as implying any particular order among or between various steps herein disclosed unless and except when the order of individual steps is explicitly described.

[0011] FIG. 1 illustrates a block diagram of an example environmental condition control and monitoring system 100 in accordance with embodiments of the present subject matter. In this example, the system 100 is set within a retail store and may be integrated with a central computing system of the retail store. Referring to FIG. 1, the central computing system of the retail store may include a server 102 or other computing device configured to be communicatively connected to one or more checkout terminals or other computing devices via a network 104 for managing retail transactions and other retail tasks. Checkout terminals and other computing devices are not shown in FIG. 1 for purpose of simplification. The network 104 may be any suitable network for facilitating communications among computing devices, such as a wired or wireless local area network (LAN).

[0012] The environmental condition control and monitoring system 100 may include computing device 106 having a system manager 108 residing thereon for operating in accordance with the present subject matter. The computing device 106 may include a network interface 110 operable to connect with the network 104 for communication with the server 102. The computing device 106 may include a user interface 112 for use by an operator. For example, the user interface 112 may include, but is not limited to, a keyboard, a display, a mouse, and the like.

[0013] The system manager 108 may include hardware, software, firmware, or combinations thereof. For example, the system manager 108 may include one or more processors and memory. The system manager 108 may facilitate environmental condition control and monitoring of one or more objects positioned within an environment 114. In this example, the environment 114 is a storage room of the retail store. The storage room 114 may contain one or more objects 116 that can require a particular environmental condition, such as temperature or humidity. Although only three (3) objects are shown in FIG. 1 for simplicity of illustration, it should be appreciated that the storage room 114 may include any number of objects. Example objects include, but are not limited to, food products, people, animals, equipment, and the like.

[0014] The system 100 may include one or more sensors 118 configured to detect objects 116 and to sense a condition of the objects 116. The objects 116 may be arranged in dif-

ferent locations within the storage room 114. As such, the sensors 118 may be positioned such that at least one of the sensors is in range for detecting each object and for sensing a condition of the object no matter where it is positioned. Further, the sensor 118 may be suitably configured to determine a specific position or location of an object within the storage room 114. The sensors 118 may be configured to either identify an object or capture a characteristic of the object that can be used to identify the object. The sensors 118 may be communicatively connected to the computing device 106. For example, the sensors 118 may be wired to the computing device or may be connected to the network 104 for communication via the network.

[0015] FIG. 2 illustrates a flowchart of an example method for environmental condition control and monitoring in accordance with embodiments of the present subject matter. For this example, reference is made to the components of the system 100 shown in FIG. 1, although the method may be implemented by any suitable computing device. More particularly, the method may be implemented by, for example, the system manager 108.

[0016] Referring to FIG. 2, the method includes determining 200 a condition profile of an object. For example, the system manager 108 of the computing device 106 shown in FIG. 1 may determine a condition profile of one or more of the objects 116. An example condition profile may define a temperature requirement of an object. The condition profile for an object may be stored in a memory 120 of the computing device 106 for access by the system manager 108. Different objects may have different condition profiles. The memory 120 may also include identifiers for each of the objects 116. An object identifier may be associated in memory 120 with its condition profile. The system manager 108 may access the memory 120 for determining a condition profile of an object.

[0017] The method of FIG. 2 includes identifying 202 the object within an environment. For example, the system manager 108 may receive either identification information or a captured characteristic of one of the objects 116. One of the sensors 118 may either identify an object or capture a characteristic of one of the objects 116. The sensor 118 may subsequently communicate this data to the computing device 106. In an example, the sensor 118 may include electronics capable of identifying an object and may communicate the identification information to the system manager 108. As an example, the object may have an identification tag (e.g., radio frequency identification tag) attached thereto that may be read by the sensor for identifying the object. In another example, the sensor 118 may capture a characteristic of an object that can be used by the system manager 108 for identifying the object. For example, the sensor 118 may have an image capture device (e.g., a camera) capable of capturing an image of the object and communicating the image data to the system manager 108, which may subsequently use the image data to identify the object in accordance with a suitable image recognition technique.

[0018] The method of FIG. 2 includes determining 204 whether the environment meets a requirement defined by the condition profile of the object. Continuing the aforementioned example, the system manager 108 may use identification information about one of the objects 116 to lookup a condition profile associated with the object in the memory 120. The condition profile may indicate, for example, a temperature range required by the object. The condition profile may also indicate a maximum time period that the object may

be in an environment outside of the temperature range. For example, a food such as a dairy product may be outside of a cold temperature range for a predefined period of time. One or more of the sensors 118 may detect a condition of the environment. For example, the sensor 118 may determine a temperature within the storage room 114 and communicate the temperature to the system manager 108. The system manager 108 may compare the storage room temperature to the requirement defined by the condition profile for the object. For example, the system manager 108 may determine whether the temperature of the storage room 114 meets the temperature requirement of the object. In a more particular example, the system manager 108 may determine whether the temperature of the storage room 114 is outside of the temperature requirement of a food product for greater than a predetermined time period (e.g., 1 hour or more).

[0019] The method of FIG. 2 includes determining 206 a hierarchy of the object. For example, the memory 120 may identify a hierarchy of the objects 116 among one another. The hierarchy may define which objects are ranked above others when controlling environment condition equipment to satisfy a condition required by an object.

[0020] The method of FIG. 2 includes controlling 208 environment conditioning equipment based on whether the environment meets the requirement and/or the determined hierarchy. Continuing the aforementioned example, the system manager 108 may control environment conditioning equipment 122 of the system 100 based on whether the environment meets the requirement. For example, the equipment 122 may be cooling equipment such as an air conditioner or refrigeration equipment capable of reducing a temperature within the storage room 114. The system manager 108 may determine that the temperature within the storage room 114 is greater than the temperature requirement of a food product. In response to determining that the storage room temperature is greater than the temperature requirement of the food product, the system manager 108 may control the equipment 122 to reduce the temperature within the storage room 114 for meeting the food product's temperature requirement. In response to determining that the storage room temperature meets the temperature requirement of the food product, the system manager 108 may not alter the settings of the equipment 122. The equipment 122 may be controlled to either increase or decrease a temperature of the storage room 114 for meeting a requirement of the object. Further, for example, the control of the equipment 122 may be based on the hierarchy of the object. In this case, if the object is the highest in the hierarchy, then its defined condition can take precedence over other objects. On the other hand, if the object is the lower in the hierarchy, then other objects' preferences may be given preference.

[0021] In another example of meeting a temperature requirement of an object, the object's condition profile may indicate that the object may be outside of a temperature range for a predefined period of time. In this case, if the system manager 108 determines that the temperature of the storage room 114 is outside of the temperature range, the system manager 108 can initiate a timer for tracking how long the temperature requirement is not met. In response to determining that the temperature of the storage room 114 is outside the range for greater than the predefined period of time, the system manager 108 may control the equipment 122 for

meeting the requirement. As an example, the system manager **108** may input control input to the equipment **122** for controlling the equipment.

[0022] Environment control equipment may be any suitable type of equipment capable of controlling a condition within an environment. Example equipment includes, but is not limited to, an air conditioner, a heater, a fan, a window, and the like. Fan speed may be controlled for cooling or heating a room. A window may be positioned for changing a temperature in a room. For example, the window may be opened or closed by a mechanism for allowing more or less air from the outside or another room to enter the room.

[0023] In accordance with embodiments of the present subject matter, the object monitored by the system manager **108** may be a person. A condition profile for the person may be stored in memory **120**. The condition profile of the person may indicate a temperature range preference, a condition schedule, preferences for one or more activities of the person, the like, and combinations thereof. In an example of a condition schedule, the profile may define different condition requirements of the object over a period of time (e.g., a person may desire for the temperature to be different depending on a time of day).

[0024] In an example of an activity preference, the profile may define different conditions set based on an activity of the object. As a specific example, a person may define a normal temperature range and have other temperature ranges defined if the person is engaged in a predefined activity (e.g., exercise or cooking). In this case, the temperature may be adjusted based on the activity. An activity may be determined by the system manager **108** based on a detected activity of the person. For example, the system manager **108** may receive images of the person from a sensor **118** and identify the activity of the person by use of a suitable image recognition technique.

[0025] In accordance with embodiments, different objects may have profiles different condition requirements. For example, the object **1 116** and the object **2 116** may have a different temperature range requirement. More particularly in this example, the object **1 116** may require a temperature range between 70 and 75 degrees, while the object **2 116** may require a temperature range of between 25 and 35 degrees. As a result, the temperature requirements are competing. A hierarchy may be defined among the objects such that the object positioned higher in the hierarchy may be given preference over a lower positioned object. For example, the object **2 116** may be a food product subject to spoilage or may be any type of item that is more expensive than another item, thus the object **2 116** may be placed higher in the hierarchy than object **1 116**. In this case, the system manager **108** may determine that object **2 116** is higher in the hierarchy and control the equipment **122** to meet the temperature requirement of between 25 and 35 degrees for object **2 116**. In another example, one object (e.g., a dairy product) may be simplified identified as having preference over other items, and thus the system manager **108** may control the equipment **122** to meet the condition requirements of the preferred object.

[0026] In an example, object hierarchy may be based upon a condition profile defined for multiple sensed environmental data types. For example, placement of a hierarchy of an object may be based on one or more of temperature, humidity, air flow, and the like. In an example, a product requiring more humidity than temperature may be placed higher in the hierarchy.

[0027] In another example, the system manager **108** may control equipment **122** based on the condition profiles of two or more objects. For example, temperature requirement ranges of two or more objects within an environment may overlap. In this case, the system manager **108** may control the equipment **122** to set the temperature within the environment to the overlapping portion of the temperature range. Thus, temperature preferences of the objects may be simultaneously met.

[0028] In accordance with embodiments, the system manager **108** may communicate a notification message to a computing device in response to determining that a requirement of an object is not being met. For example, the object **3 116** may have a specific temperature and humidity requirement defined by its profile. The system manager **108** may determine that one or more of the requirements have not been met for greater than a predefined time period. In response to determining this, the system manager **108** may generate a notification and communicate the message to the server **102** via the network **104**. The server **102** may subsequently present the notification to an operator. As a result, the operator may be notified and take appropriate action.

[0029] In accordance with embodiments, the system manager **108** may determine a location of an object and control the equipment **122** based on the location of the object. For example, the object may be a person, and the person may have preferences set in his or her profile based on a location of the person within a house. For example, the person may set a low temperature range if the person is located in a kitchen or a room containing exercise equipment. Further, for example, the person may set a higher temperature range if the person is located in a living room or dining room. The system manager **108** may receive information from sensors regarding the person's location and adjust the temperature in the location in accordance with the preference for the location.

[0030] In accordance with embodiments, the system manager **108** may maintain and store a condition record of an environment over a time period while the object is within the environment. For example, the system manager **108** may log a record for temperature within the storage room **114** while an object is within the storage room **114**. The temperature record may be associated with an identifier for the object. In this way, a person may subsequently access the record to confirm that the object was maintained at a proper temperature while the object was stored in the room **114**.

[0031] In another example, an object may be transported along a route and the environmental condition of the object along the route may be obtained and stored. For example, a food product, such as lobster, may have a particular temperature requirement that must be met during its transportation route to a grocery store. A truck transporting the lobster may include one or more sensors within the storage area of its trailer for recording the temperature of the storage area. The temperature record may be suitably stored by a computing device within the truck, or the data wirelessly communicated for remote storage and processing. Further, for example, the coordinates and/or time of the temperature recordings may be recorded. The temperature, coordinate, and/or time information may be communicated to, for example, the server **102** or the computing device **106** for access by a user to be assured that the food product was maintained at a proper temperature during an entirety of the transportation route.

[0032] In accordance with embodiments, a condition to which an object is exposed may be recorded and compared or

weighed in the hierarchy of objects such that if an object, such as a dairy product, has been exposed to conditions outside of its specification, then the object may be not be considered in the hierarchy. For example, a dairy product, such as milk, may be considered spoiled after being exposed to a high temperature for greater than a predefined time period. In this example, an alert or notification may be communicated to a computing device in accordance with the present subject matter. In addition, the requirements of the dairy product may be ignored, because the dairy product may be considered to be spoiled.

**[0033]** In accordance with embodiments, a condition to which an object is exposed may be recorded and action taken in response to the condition meeting a predefined condition. As an example, a food product, such as lettuce, may be exposed to a less than optimum temperature before delivery and this condition exposure recorded. In this example, the profile may indicate that a corrective action may be taken, such as exposing the lettuce to a high level of humidity for greater than a predefined time.

**[0034]** In another example, a system may identify lettuce in an open container and apples in a closed container. The apples may be associated with a condition profile requiring a temperature bound such that the lower temperature is in keeping the lettuce tenable. The lettuce may have the low apple temperature as a high temperature but if kept at that the higher temperature the lettuce may need more humidity to protect them, hence the lettuce would take hierarchical preference above the apples such that the temperature is lowered to protect the lettuce but at that temp the lettuce will require humidity and that will rate higher in an analytic determination. The hierarchy may thus be based on smart analytical determination based on product needs as described and input by human experiments and knowledge of those products.

**[0035]** In accordance with embodiments, conditions to which one or more objects are exposed may be continuously monitored and equipment controlled in response to the monitored conditions. Thus, the equipment may be continuously controlled based on a determined condition of the object over time.

**[0036]** In an example scenario, a storage room may be configured such that an object can be placed in an area having a higher temperature, humidity, and/or air flow than another area. In this case, for example, the temperature of the air at the 1 foot level may be different than at the 10 foot level. in a retail setting for example, apples need to be stored down low to take advantage of the cooler temp near the floor whereas paper products such as napkins can be stored up high. The automated store room can poll the environment (from top to bottom), the products, their locations and subsequently move and adjust the locations of the products within the environment. This can involve the hierarchical analytics adding in when and if a product can be moved about. The ability to move the product can be factored in to the hierarchical computations. In addition, store personnel may be notified about a suggested move such that the store personnel may go to the storage room to move the object in accordance with the suggestion.

**[0037]** The various techniques described herein may be implemented with hardware or software or, where appropriate, with a combination of both. Thus, the methods and apparatus of the disclosed embodiments, or certain aspects or portions thereof, may take the form of program code (i.e., instructions) embodied in tangible media, such as floppy diskettes, CD-ROMs, hard drives, or any other machine-read-

able storage medium, wherein, when the program code is loaded into and executed by a machine, such as a computer, the machine becomes an apparatus for practicing the presently disclosed subject matter. In the case of program code execution on programmable computers, the computer will generally include a processor, a storage medium readable by the processor (including volatile and non-volatile memory and/or storage elements), at least one input device and at least one output device. One or more programs may be implemented in a high level procedural or object oriented programming language to communicate with a computer system. However, the program(s) can be implemented in assembly or machine language, if desired. In any case, the language may be a compiled or interpreted language, and combined with hardware implementations.

**[0038]** The described methods and apparatus may also be embodied in the form of program code that is transmitted over some transmission medium, such as over electrical wiring or cabling, through fiber optics, or via any other form of transmission, wherein, when the program code is received and loaded into and executed by a machine, such as an EPROM, a gate array, a programmable logic device (PLD), a client computer, a video recorder or the like, the machine becomes an apparatus for practicing the presently disclosed subject matter. When implemented on a general-purpose processor, the program code combines with the processor to provide a unique apparatus that operates to perform the processing of the presently disclosed subject matter.

**[0039]** Features from one embodiment or aspect may be combined with features from any other embodiment or aspect in any appropriate combination. For example, any individual or collective features of method aspects or embodiments may be applied to apparatus, system, product, or component aspects of embodiments and vice versa.

**[0040]** While the embodiments have been described in connection with the various embodiments of the various figures, it is to be understood that other similar embodiments may be used or modifications and additions may be made to the described embodiment for performing the same function without deviating therefrom. Therefore, the disclosed embodiments should not be limited to any single embodiment, but rather should be construed in breadth and scope in accordance with the appended claims.

What is claimed:

1. A method comprising:

determining a condition profile of an object;  
 identifying the object within an environment;  
 determining whether the environment meets a requirement defined by the condition profile of the object; and  
 controlling environment conditioning equipment based on whether the environment meets the requirement.

2. The method of claim 1, wherein determining a condition profile comprises determining a temperature requirement of the object.

3. The method of claim 1, wherein identifying the object comprises identifying the object as being one of a food product and a person, and

wherein the method further comprises associating the object with the condition profile.

4. The method of claim 1, wherein determining whether the environment meets the condition profile of the object comprises detecting a condition of the object,

wherein the method further comprises determining a control input for the environment conditioning equipment

- based on the detected condition for meeting a requirement defined by the condition profile of the object, and wherein controlling environmental conditioning equipment comprises inputting the control input to the environment conditioning equipment.
- 5.** The method of claim **4**, wherein inputting the control input comprises inputting the control input as a command to one of increase and decrease a temperature about a location of the object.
- 6.** The method of claim **1**, wherein the condition profile defines a condition schedule of the object that defines different condition requirements of the object over a period of time.
- 7.** The method of claim **1**, wherein controlling environment conditioning equipment comprises one of controlling an air conditioner, controller a heater, controlling a fan, and positioning a window.
- 8.** The method of claim **1**, further comprising determining an activity of the object, and  
wherein controlling environment conditioning equipment comprises controlling the environment conditioning equipment based on the activity of the object.
- 9.** The method of claim **1**, wherein the object is a first object,  
wherein the method further comprises:  
determining a condition profile of a second object located within the environment; and  
determining a hierarchy of the first and second objects with respect to each other, and  
wherein controlling environment conditioning equipment comprises controlling the environment conditioning equipment based on the determined hierarchy.
- 10.** The method of claim **9**, wherein the object is a first object,  
wherein the method further comprises identifying a second object located within the environment, and  
wherein controlling the environment conditioning equipment comprises controlling the environment conditioning equipment to meet a requirement of the first object based on a preference of the first object over the second object.
- 11.** The method of claim **1**, wherein the object is a first object,  
wherein the method further comprises determining a condition profile of a second object located within the environment, and  
wherein controlling environment conditioning equipment comprises controlling the environment conditioning equipment based on the condition profiles of the first and second objects.
- 12.** The method of claim **1**, wherein the condition profile defines a requirement of the object,  
wherein the method further comprises:  
determining whether the requirement of the object is met; and  
in response to determining that the requirement is not being met, communicating a notification to a computing device.
- 13.** The method of claim **1**, further comprising determining a location of the object, and  
wherein controlling environment conditioning equipment comprises controlling environment conditioning equipment based on the location of the object.
- 14.** The method of claim **1**, wherein the object is a product, and the environment is a retail environment, and  
wherein the method further comprises:  
storing identification of the product; and  
associating the identification with a condition profile of the object.
- 15.** The method of claim **1**, further comprising:  
storing a condition record of the environment over a time period while the object is within the environment; and  
associating the condition record with an identifier of the object.
- 16.** The method of claim **15**, wherein the environment comprises different locations along a transportation route.
- 17.** A system comprising:  
at least a processor and memory configured to:  
determine a condition profile of an object;  
identify the object within an environment;  
determine whether the environment meets a requirement defined by the condition profile of the object; and  
control environment conditioning equipment based on whether the environment meets the requirement.
- 18.** The system of claim **17**, wherein the at least a processor and memory are configured to determine a temperature requirement of the object.
- 19.** The system of claim **17**, wherein the at least a processor and memory are configured to:  
identify the object as being one of a food product and a person; and  
associate the object with the condition profile.
- 20.** The system of claim **17**, wherein the at least a processor and memory are configured to:  
detect a condition of the object;  
determine a control input for the environment conditioning equipment based on the detected condition for meeting a requirement defined by the condition profile of the object; and  
input the control input to the environment conditioning equipment.
- 21.** The system of claim **20**, wherein the at least a processor and memory are configured to input the control input as a command to one of increase and decrease a temperature about a location of the object.
- 22.** The system of claim **17**, wherein the condition profile defines a condition schedule of the object that defines different condition requirements of the object over a period of time.
- 23.** The system of claim **17**, wherein the at least a processor and memory are configured to one of controlling an air conditioner, controller a heater, controlling a fan, and positioning a window.
- 24.** The system of claim **17**, wherein the at least a processor and memory are configured to:  
determine an activity of the object; and  
control the environment conditioning equipment based on the activity of the object.
- 25.** The system of claim **17**, wherein the object is a first object,  
wherein the at least a processor and memory are configured to:  
determine a condition profile of a second object located within the environment;  
determine a hierarchy of the first and second objects with respect to each other; and  
control the environment conditioning equipment based on the determined hierarchy.
- 26.** The system of claim **25**, wherein the object is a first object, and

- wherein the at least a processor and memory are configured to:
- identify a second object located within the environment,
  - and
  - control the environment conditioning equipment to meet a requirement of the first object based on a preference of the first object over the second object.
- 27.** The system of claim **17**, wherein the object is a first object, and
- wherein the at least a processor and memory are configured to:
- determine a condition profile of a second object located within the environment; and
  - control the environment conditioning equipment based on the condition profiles of the first and second objects.
- 28.** The system of claim **17**, wherein the condition profile defines a requirement of the object,
- wherein the at least a processor and memory are configured to:
- determine whether the requirement of the object is met;
  - and
  - communicate a notification to a computing device in response to determining that the requirement is not being met.
- 29.** The system of claim **17**, wherein the at least a processor and memory are configured to:
- determine a location of the object; and
  - control environment condition equipment based on the location of the object.
- 30.** The system of claim **17**, wherein the object is a product, and the environment is a retail environment, and
- wherein the at least a processor and memory are configured to:
- store identification of the product; and
  - associate the identification with a condition profile of the object.
- 31.** The system of claim **17**, wherein the at least a processor and memory are configured to:
- store a condition record of the environment over a time period while the object is within the environment; and
  - associate the condition record with an identifier of the object.
- 32.** The system of claim **31**, wherein the environment comprises different locations along a transportation route.

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