

PASSIVE CARE CONTROL METHOD AND ASSOCIATED SYSTEMS

Technical Field

[0001] The present invention relates generally to a passive care control method and associated systems.

Background

[0002] In certain facilities where people live who require supervision or monitoring for health or care reasons, when such a person becomes incapacitated and requires assistance, it is not always easy for that person to indicate to a relevant authority or authorised carer that assistance is required. For example, in healthcare facilities and aged care facilities etc., providing specialised equipment such as alert systems and alarm buttons that have been specifically developed to enable these persons to only request assistance in times of need may not be viable cost wise and may also require additional installation costs.

[0003] In an aged care facility for example, residents may live semi-autonomously in their own unit. Many accidents occur in wet environments such as the bathroom. However, when an accident occurs, it is not unusual for the resident to be incapacitated and not be in a position to call out for help. Similar scenarios are also envisioned in other environments where other physical consumables are provided, such as gas and electricity.

Summary

[0004] Embodiments of the present invention seek to substantially overcome, or at least ameliorate, one or more disadvantages of existing arrangements.

[0005] Disclosed are arrangements which seek to address the above problems by monitoring usage of a physical consumable and determining whether abnormal usage of the physical consumable has occurred. Upon determination of abnormal usage, an abnormal usage indicator may be generated and sent to a registered device to provide an alert of the abnormal usage.

[0006] According to a first aspect of the present disclosure, there is provided a method for detecting abnormal usage of water in a water usage environment, wherein the method comprises the steps of: monitoring detected water usage data

associated with the provision of water in a water usage environment using a plurality of different types of water provisioning device that are arranged to provide water, where the different types of water provisioning device are selected from the group consisting of: a tap; a toilet flush; a shower unit; applying weightings to the detected water usage data based on the type of water provisioning device; and detecting abnormal usage of water based on the monitoring of the detected water usage data and the applied weightings; and generating an alert based on the detection of the abnormal usage, wherein the alert indicates that a user of the at least one water provisioning device needs assistance.

[0007] According to an aspect of the present disclosure, there is provided a method for detecting abnormal usage of a physical consumable in a physical consumable usage environment, wherein the method comprises the steps of: monitoring detected usage data associated with the provision of at least one physical consumable in a physical consumable usage environment using at least one physical consumable provisioning device that is arranged to provide the physical consumable; and detecting abnormal usage of the physical consumable based on the monitoring of the detected usage data.

[0008] The method may include the step of wirelessly transmitting the detected usage data to at least one abnormal usage monitoring device, wherein the step of detecting the abnormal usage is performed by the monitoring device. Also, the abnormal usage monitoring device may be a gateway device or a server in a building management system.

[0009] The method may include the step of detecting the abnormal usage are performed by a physical consumable monitoring device associated with the physical consumable provisioning device.

[0010] The method may include the step of generating an alert based on the detection of the abnormal usage.

[0011] The method may include the step of sending the generated alert to one or more registered devices associated with the usage of the physical consumable.

[0012] The method may include the steps of comparing the detected usage data with prior usage data associated with prior use of the physical consumable by the physical consumable provisioning device, and detecting the abnormal usage of the physical consumable based on the comparison of the detected usage data with the prior usage data.

[0013] The method may include the step of comparing the detected usage data with the prior usage data by detecting whether the detected usage data matches a usage pattern associated with the prior usage data.

[0014] The method may include the step of comparing the detected usage data with the prior usage data comprises detecting a maximum and/or minimum prior usage value in the prior usage data and comparing the detected maximum and/or minimum prior usage value with maximum and/or minimum values in the detected usage data.

[0015] The method may include the step of comparing the detected usage data with the prior usage data is based on an amount the physical consumable has been used in a defined usage period.

[0016] The step of comparing may include the step of comparing a current usage amount of the physical consumable with a previously detected usage amount of the physical consumable and generating an alert if the current usage amount is below or above a defined threshold associated with the previously detected usage amount.

[0017] The step of comparing the detected usage data with the prior usage data may be based on a time that the physical consumable was or is being used in a defined usage period.

[0018] The step of comparing may include the step of comparing a current usage time of the physical consumable with a previously detected usage time of the physical consumable in the usage period and generating an alert if the current usage time is below or above a defined threshold associated with the previously detected usage time.

[0019] The method may include the step of monitoring and recording the prior usage data.

[0020] The physical consumable may be one consumable in a group of consumables that includes water, gas and electricity.

[0021] The physical consumable usage environment may be one usage environment in a group of usage environments that includes a water usage environment, a gas usage environment and an electricity usage environment.

[0022] A physical consumable monitoring device is provided that includes a processor and memory, wherein the memory includes software code arranged to cause the processor to implement a method for detecting abnormal usage of a physical consumable in a physical consumable usage environment, wherein the method comprises the steps of: monitoring detected usage data associated with the provision of at least one physical consumable in a physical consumable usage environment using at least one physical consumable provisioning

device that is arranged to provide the physical consumable; and detecting abnormal usage of the physical consumable based on the monitoring of the detected usage data.

[0023] The physical consumable monitoring device may be part of or integrated with one or more of an electrical, gas or water provisioning device.

[0024] The physical consumable monitoring device may be part of or integrated with one or more of an item of tap ware, a shower unit and a flush unit.

[0025] A central gateway device in a building management system is provided that includes a processor and memory, wherein the memory includes software code arranged to cause the processor to implement a method for detecting abnormal usage of a physical consumable in a physical consumable usage environment, wherein the method comprises the steps of: monitoring detected usage data associated with the provision of at least one physical consumable in a physical consumable usage environment using at least one physical consumable provisioning device that is arranged to provide the physical consumable; and detecting abnormal usage of the physical consumable based on the monitoring of the detected usage data.

[0026] A server in communication with a building management system is provided, wherein the server includes a processor and memory, wherein the memory includes software code arranged to cause the processor to implement a method for detecting abnormal usage of a physical consumable in a physical consumable usage environment, wherein the method comprises the steps of: monitoring detected usage data associated with the provision of at least one physical consumable in a physical consumable usage environment using at least one physical consumable provisioning device that is arranged to provide the physical consumable; and detecting abnormal usage of the physical consumable based on the monitoring of the detected usage data.

[0027] Other aspects are also disclosed.

Brief Description of the Drawings

[0028] At least one embodiment of the present invention will now be described with reference to the drawings and appendices, in which:

[0029] Fig. 1 shows components forming at least part of a building management system for monitoring abnormal usage of a physical consumable according to the present disclosure;

[0030] Fig. 2 shows a physical consumable monitoring device according to the present disclosure;

[0031] Fig. 3 shows a gateway device forming at least part of a building management system according to the present disclosure;

[0032] Fig. 4 shows a server forming at least part of a building management system according to the present disclosure;

Detailed Description including Best Mode

[0033] The herein description provides details of a method, system, and associated components that provide passive care to one or more individuals. The term “passive” is intended to mean that care is provided in the background without the user having to actively indicate that care is specifically required. That is, a situation is passively monitored without the user being required to diverge from their everyday routine.

[0034] Fig. 1 shows an example arrangement of various electronic control devices in the form of water provisioning devices, such as electronic tap ware 101, an electronic shower unit 103 and an electronic toilet flush 105, which are used in a physical consumable usage environment, such as a bathroom 107.

[0035] Each of these electronic control devices includes an electronic system that is arranged to detect and/or monitor usage of the water that the device is using in order to generate usage data associated with that device. One or more of the electronic control devices may be part of a building management system (BMS).

[0036] The electronic system in each electronic control device is also arranged to wirelessly communicate with a central gateway device 109. For example, the electronic control device may wirelessly communicate using Bluetooth or a Wi-Fi connection. Each electronic control device may have a unique ID in order for the central gateway device to associate the received data with that electronic control device.

[0037] The central gateway device is arranged to communicate with a server 111 via the Internet 113. The central gateway device may be part of a building management system (BMS). The central gateway device may connect with multiple electronic control devices throughout a single building, for example, in multiple bathrooms in a single aged care facility. There may also be multiple central gateway devices that are used where each connects to a group of electronic control devices located in one or more groups of bathrooms.

[0038] The central gateway device is connected to the Internet (e.g. via a local wireless modem built into the device, a local independent wirelessly connected modem, a 3G/4G data enabled connection (e.g. via a dongle or the like, via a wired connection to a modem, or via an ad-hoc connection (e.g. Bluetooth) to a smart telephone).

[0039] The server 111 is arranged to communicate with one or more registered devices 115, which may be, for example, in the form of a smart phone, a laptop, tablet, PC or any other consumable electronic device that can communicate with the server.

[0040] The devices may be registered by providing details associated with the device to a server via a website. The details may include the number of the device (if a telephone), IP address or location, ID number etc. Further, when registering the device, details of the user of the consumable provisioning device may be provided, such as the user's location, address, name, contact number etc. Further, when registering the device, details of the consumable provisioning device may also be provided, such as the device's unique ID number, location, type etc. This information is stored by the server to enable any alerts or alarms associated with a user or consumable provisioning device to be communicated to the correct registered device.

[0041] Details of an example physical consumable monitoring device incorporated within or in communication with the consumable electronic device is provided in Fig. 2

[0042] Fig. 2 shows a block diagram of a physical consumable monitoring device 201 which may be separate from, form part of or be integrated into an electronic control device (e.g. 102, 103, 105) for controlling operation of one or more bathroom products.

[0043] The monitoring device 201 has a power unit 203 that provides power to a processor 205, memory 207, I/O port 209 and transceiver module 211.

[0044] The memory 207 stores an algorithm in the form of a software program to cause the processor 205 to operate according to defined instructions. The memory 207 may also be used

to store (temporarily or semi-permanently) data associated with the operations of the processor 205. This data may include usage data as well as indications of abnormal usage associated with one or more bathroom products.

[0045] The control device may be connected to one or more taps, shower units and toilet flush units as well as any other type of bathroom product that uses water. The control device may be used by a user to control the use of the bathroom product using control signals, such as switching the flow of water in the bathroom product on and off etc. The control device or the monitoring device may be arranged to monitor the provision of the physical consumable. That is, usage data for the provision of the physical consumable may be monitored and recorded using one or other of the control device and the monitoring device. It will be understood that the components in the monitoring device may be separate components to those in the control device or may be shared (i.e. the same) components used in the control device.

[0046] In one example described in more detail herein, the software in the monitoring device is arranged to cause the processor to monitor the provision (and so usage) of the water (physical consumable) for a particular bathroom product associated with a particular user. In this example, the software in the monitoring device is arranged to cause the processor to monitor (and so determine) whether the provision of the water is abnormal usage. Various methods may be employed to detect whether abnormal usage has occurred, and these are discussed in detail herein.

[0047] In another example, the monitoring device may communicate with the electronic control device to obtain usage data of the water in order to determine whether the provision of the water is abnormal usage.

[0048] The input port 209 connects to a sensor 213 that senses usage of the physical consumable, such as water. Any known sensor or sensing system may be used to detect the provision of the physical consumable. The input port receives sensor data from the sensor, where the sensor data is based on the usage of the consumable. Further, the input port 209 may be part of a general I/O port that includes an output to communicate one or more control signals to control how the physical consumable is provided by the provisioning device. For example, where the physical consumable is water, the control signals may determine whether water is provided, how much water is provided, the amount of water flow etc.

[0049] The transceiver module 211 connects and communicates data with the central gateway device 109. This data may include one or more of usage data, abnormal usage data, alert data,

alarm data, or any other data that has been generated or obtained by the electronic control device and/or monitoring device.

[0050] It will be understood that the physical consumable monitoring device may be a physically separate device from the electronic control device but may still communicate with the electronic control device to obtain usage data of a physical consumable associated with a particular provisioning device and/or a particular user.

[0051] An example central gateway device and an example server are provided in Figs. 3 and 4 respectively.

[0052] Fig. 3 shows a block diagram of a central gateway device 109. The central gateway device may be part of a building management system (BMS).

[0053] The central gateway device 109 has a power unit 303 that provides power to a processor 305, memory 307 and a transceiver module 311.

[0054] The memory 307 stores an algorithm in the form of a software program to cause the processor 305 to operate according to defined instructions. The memory 307 may also be used to store (temporarily or semi-permanently) data associated with the operations of the processor 305. This data may include usage data as well as indications of abnormal usage associated with one or more bathroom products.

[0055] The transceiver module 311 connects and communicates data with one or more physical consumable monitoring devices 201 and/or electronic control devices (101, 103 or 105). This data may include one or more of usage data, abnormal usage data, alert data, alarm data, or any other data that has been generated or obtained by the central gateway device 109.

[0056] The transceiver module 311 also connects and communicates data with one or more servers 111. This data may also include one or more of usage data, abnormal usage data, alert data, alarm data, or any other data that has been generated or obtained by the central gateway device 109. The communication with the server may be via a modem or any other suitable communication means to enable the central gateway device to communicate with the server. For example, the central gateway device may communicate with the server via the Internet using any suitable communication protocols or messages.

[0057] Fig 4 shows a block diagram of a server 111. The server may be part of a building management system (BMS).

[0058] The server 111 has a power unit 403 that provides power to a processor 405, memory 407, an input module 413 and an output module 415.

[0059] The memory 407 stores an algorithm in the form of a software program to cause the processor 405 to operate according to defined instructions. The memory 407 may also be used to store (temporarily or semi-permanently) data associated with the operations of the processor 405. This data may include usage data as well as indications of abnormal usage associated with one or more bathroom products. The memory 407 may be used in conjunction with other storage modules (not shown) and databases.

[0060] The input module 413 of the server 111 connects and receives data from one or more central gateway devices 109 either directly or via a building management system. This data may include one or more of usage data, abnormal usage data, alert data, alarm data, or any other data that has been generated or obtained by the central gateway device 109, a connected physical consumable monitoring device 201 or an electronic control device (101, 103 or 105). The communication between the server and the central gateway device may utilise any suitable form of communication protocols to enable the server to communicate with the central gateway device. For example, the server may communicate with the central gateway device via the Internet using any suitable communication protocols or messages.

[0061] The output module 415 of the server 111 connects and communicates data to one or more registered devices 115. This data may include one or more of usage data, abnormal usage data, alert data, alarm data, or any other data that has been generated or obtained by the server 111. The communication with the server may be via an output port or any other suitable communication device to enable the server to communicate with the registered devices. For example, the server may communicate with the registered devices via the Internet using any suitable communication protocols or messages.

[0062] The various components described above in relation to Figs. 1-4 are used to monitor the provision of various physical consumables such as water, gas and electricity. The provision of the physical consumable is monitored to assess or determine whether abnormal usage has occurred that would indicate that there is a risk that the associated user requires assistance. For example, the current usage may be compared to known potential alert usage patterns for a particular consumable provisioning device and/or a particular user. Also, prior usage may be

recorded to assess whether abnormal usage is occurring. If it is determined that abnormal usage is occurring, then an abnormal usage notification in the form of, for example, an alert and/or alarm may be generated and sent to one or more registered devices that are associated with the user or usage of the consumable. The alert or alarm may be, for example, one or more of an email, an SMS, a telephone calls, an electronic alert, a communication to a software program operating on an electronic device etc. Any of the physical consumable monitoring device, central gateway device and server may i) determine whether abnormal usage has occurred, ii) communicate that abnormal usage has occurred, iii) generate an alert or alarm, and iv) communicate an alert or alarm.

[0063] Normal usage behaviour patterns may be recorded by the system. That is, metrics associated with normal usage of the various products (e.g. bathroom products) when a person is not incapacitated may be tracked and recorded. Using artificial intelligence (AI), usage patterns over a defined period of time, e.g. a month, may be recorded and associated with an individual user, who is associated with the products. For example, if a user uses a particular bathroom product at the same time every day, this pattern is recorded. If the detected current usage (or non-usage) by the user deviates from this pattern, an alert may be generated. Patterns of usage of one product may be monitored in association with patterns of usage of other products in order to provide a more complex analysis. For example, shower usage may be monitored alongside toilet usage in order to detect abnormal usage. A series of weightings may be applied to different products based on whether it would be considered essential for their use within a defined period, such as the toilet for example. Whereas, a lower weighting may be applied to usage of the shower or tap ware. That is, usage of what are considered more essential products may have higher weighting values associated with them in order to determine whether abnormal usage has occurred.

[0064] Several examples are now provided to show how the herein described system, or variations of it, may operate in order to detect abnormal usage of a physical consumable.

[0065] The following example describes how a physical consumable monitoring device may detect abnormal usage in a bathroom environment.

[0066] The physical consumable monitoring device may be associated with, part of, or integrated with one or more physical consumable provisioning devices and/or electronic control devices. The physical consumable provisioning devices may be associated with, part of, or integrated with one or more electronic control devices.

[0067] The electronic control devices may be a device such as a tap ware device 101, shower unit 103 or flush unit 105 as shown in Figure 1. The functionality of the monitoring device may be incorporated into the existing components of the control device or maybe formed as separate components.

[0068] Where the electronic control device is a shower unit 103, for example, the control device detects usage of water provisioned by the shower unit to generate usage data. The usage data may be recorded in memory by the control device alongside a unique ID associated with the shower unit. The usage data may be recorded in memory by the control device alongside a unique ID associated with a user associated with the shower unit. The usage data may include one or more data items such as time of use, day of the week of use, date of use, amount of the water that was used for a given period, the unique ID of the shower unit (physical consumable provisioning device), and the unique ID of the user. The monitoring device may monitor the detected usage data. The monitoring may be carried out in real time or maybe carried out at defined times or in defined time periods. The processor in the monitoring device detects abnormal usage of the water being provisioned by the shower unit by monitoring the detected usage data that it is receiving from the control device and utilising a process as described in further detail herein to analyse the usage data based on prior usage data in order to assess whether abnormal usage is occurring. The monitoring device may then generate an alert when the abnormal usage has been detected.

[0069] The generated alert may be in any suitable format. The alert is then communicated by the monitoring device to the central gateway device. The central gateway device then communicates the alert to the server. The server then communicates the alert to a registered device that has been registered with that particular electronic control device, monitoring device or a user associated with the electronic control device or monitoring device. For example, the registered device may be a mobile telephone that has been registered by an aged car facility or a health facility.

[0070] The following example describes how a central gateway device, being used as an abnormal usage monitoring device, may detect abnormal usage of water in a bathroom environment.

[0071] As described in the above example for a shower unit, the electronic control device may record usage data in memory alongside a unique ID associated with the shower unit. The usage data may be recorded in memory by the control device alongside a unique ID associated with a user associated with the shower unit. The usage data may include one or more data

items such as time of use, date of use, amount of the water that was used for a given period, the unique ID of the shower unit (physical consumable provisioning device), and the unique ID of the user. The detected usage data may be communicated to the central gateway device, which then monitors the detected usage data. The monitoring may be carried out in real time or maybe carried out at defined times or in defined time periods. The processor in the central gateway device detects abnormal usage of the water being provisioned by the shower unit by monitoring the detected usage data that it is receiving from the control device and utilising a process as described in further detail herein to analyse the usage data based on prior usage data in order to assess whether abnormal usage is occurring. The central gateway device may then generate an alert when the abnormal usage has been detected.

[0072] As discussed above, the generated alert may be in any suitable format. The alert is then communicated by the central gateway device to the server. The server then communicates the alert to a registered device that has been registered with that particular electronic control device, monitoring device or a user associated with the electronic control device or monitoring device. For example, the registered device may be a mobile telephone that has been registered by an aged car facility or a health facility.

[0073] The following example describes how a server, being used as an abnormal usage monitoring device, may detect abnormal usage of water in a bathroom environment.

[0074] As described in the above example for a shower unit, the electronic control device may record usage data in memory alongside a unique ID associated with the shower unit. The usage data may be recorded in memory by the control device alongside a unique ID associated with a user associated with the shower unit. The usage data may include one or more data items such as time of use, date of use, amount of the water that was used for a given period, the unique ID of the shower unit (physical consumable provisioning device), and the unique ID of the user. The detected usage data may be communicated to the central gateway device. The central gateway device may then communicate the detected usage data to the server. The server then monitors the detected usage data. The monitoring may be carried out in real time or maybe carried out at defined times or in defined time periods. The processor in the server detects abnormal usage of the water being provisioned by the shower unit by monitoring the detected usage data that it is receiving from the central gateway device and utilising a process as described in further detail herein to analyse the usage data based on prior usage data in order to assess whether abnormal usage is occurring. The server may then generate an alert when the abnormal usage has been detected.

[0075] As discussed above, the generated alert may be in any suitable format. The alert is then communicated by the server to a registered device that has been registered with that particular electronic control device, monitoring device, or a user associated with the electronic control device or monitoring device. For example, the registered device may be a mobile telephone that has been registered by an aged car facility or a health facility.

[0076] It will be understood that one or more of the monitoring device, central gateway device and server may perform part of or the entire detection process used to detect abnormal usage.

[0077] In accordance with any one of examples described herein, different analytical methods may be used by the monitoring device, central gateway device and server to carry out the detection of the abnormal usage.

[0078] The detected usage data may be compared with prior usage data associated with prior use of the physical consumable by the physical consumable provision device. For example, prior water usage data may be stored. Abnormal usage of the physical consumable, e.g. water, may be detected based on a comparison of the detected usage data with the prior usage data. For example, if the volume of water detected for a particular bathroom product exceeds a volume of water previously used in a defined period, then the system may flag this usage as an abnormal usage and generate an alert accordingly.

[0079] Alternatively, or in combination, the processor in the device may compare the detected usage data with the prior usage data in order to detect whether the detected usage data matches, fits into or corresponds with a pattern associated with the prior usage data. Upon comparing, if the processor determines that the detected usage data does not match, deviates above a defined threshold or is substantially different to the pattern, then an alert may be generated.

[0080] The detected usage data may be compared with the prior usage data by detecting a maximum and/or minimum prior usage value in the prior usage data and then comparing the detected maximum and/or minimum prior usage value with maximum and/or minimum values in the detected usage data in a defined period. For example, a detected maximum prior usage value may be compared with an associated maximum value in the detected usage data. Alternatively, a detected minimum prior usage value may be compared with an associated minimum value in the detected usage data. Alternatively, a detected maximum prior usage value and a detected minimum prior usage value may be compared with an associated maximum value in the detected usage data and a minimum value in the detected usage data.

In each of these examples, if the difference between the two compared values is outside of a determined threshold, or not within a determined threshold, an alert may be generated. This detected usage data may be compared with the prior usage data based on an amount the physical consumable has been used (or not used) in a defined usage period.

[0081] A current usage amount of the physical consumable may be compared with a previously detected usage amount of the physical consumable. An alert may be generated if the current usage amount is determined to be below or above a defined threshold associated with the previously detected usage amount. This detected usage data (current usage amount) may be compared with the prior usage data based on a time that the physical consumable was or is being used in a defined usage period. That is, the current usage amount may be a quantitative value associated with a defined time or period.

[0082] A current usage time (e.g. a specific time of day or night, or a time period (e.g. morning, lunchtime, evening etc.) of the physical consumable may be compared with a previously detected usage time of the physical consumable in the usage period. An alert may be generated if the current usage time is below or above a defined threshold associated with the previously detected usage time.

[0083] In order to carry out the analytic steps, the prior usage data may be monitored and recorded.

[0084] Further, the abnormal usage detection process may analyse the usage data to determine whether the usage data matches any patterns known to be considered an abnormal use. Alternatively, the abnormal usage detection process may analyse the usage data to determine whether the usage data does not match any patterns known to be considered normal use. If the usage data is determined to differ from patterns known to be considered normal by a determined threshold, or usage data is determined to be similar enough to patterns known to be abnormal within a determined threshold, then the system may determine that abnormal usage has occurred and an alert or alarm may be generated.

[0085] A baseline of normal usage data may also be generated and stored. The abnormal usage detection process may analyse the usage data and compare it with the baseline data to determine whether the usage data is considered to be abnormal or normal use dependent on how much the usage data varies compared with the baseline data. If the variation exceeds or is below a determined threshold, then the system may determine that abnormal usage has occurred and an alert or alarm may be generated.

[0001] Therefore, the process and system described herein enables the detection of abnormal usage of a physical consumable, such as water, gas or electricity, in a physical consumable usage environment, such as a bathroom. Detected usage data that is associated with the provision of at the physical consumable is used to detect abnormal usage of the physical consumable based on the monitoring of the detected usage data.

[0002] In the examples described above, the bathroom is an example of a physical consumable usage environment. It will be understood that the methods and systems described herein may be applied to other physical consumable usage environments such as, for example, other water usage environments, gas usage environments and electricity usage environments. That is, the systems described herein may be adapted to monitor usage of gas and electricity and to detect abnormal usage of gas and electricity using the herein described abnormal usage detection methods. The detection of abnormal usage may then be used to generate an alert or alarm.

[0003] It will also be understood that the physical consumable monitoring devices described herein may be used to monitor any suitable physical consumable, such as water, gas or electricity.

[0004] It will be understood that the detection or determination of abnormal usage may include the detection or determination of non-usage of the consumable as well as usage of the consumable, where that non-usage and usage are determined to be abnormal.

Industrial Applicability

[0005] The arrangements described are applicable to the consumable provisioning industries, data analytics industries and particularly for industries concerned with detecting whether a person is incapacitated or requires assistance.

[0006] The foregoing describes only some embodiments of the present invention, and modifications and/or changes can be made thereto without departing from the scope and spirit of the invention, the embodiments being illustrative and not restrictive.

[0007] In the context of this specification, the word "comprising" means "including principally but not necessarily solely" or "having" or "including", and not "consisting only of". Variations of the word "comprising", such as "comprise" and "comprises" have correspondingly varied meanings.

CLAIMS

1. A method for detecting abnormal usage of water in a water usage environment, wherein the method comprises the steps of:
monitoring detected water usage data associated with the provision of water in a water usage environment using a plurality of different types of water provisioning device that are arranged to provide water, where the different types of water provisioning device are selected from the group consisting of: a tap; a toilet flush; a shower unit;
applying weightings to the detected water usage data based on the type of water provisioning device and
detecting abnormal usage of the water based on the monitoring of the detected water usage data and the applied weightings, and
generating an alert based on the detection of the abnormal usage, wherein the alert indicates that a user of the at least one water provisioning device needs assistance.
2. The method of claim 1 further comprising the step of wirelessly transmitting the detected usage data to at least one abnormal usage monitoring device, wherein the step of detecting the abnormal usage is performed by the monitoring device.
3. The method of claim 2, wherein the abnormal usage monitoring device is a gateway device or a server in a building management system.
4. The method of claim 1, wherein the step of detecting the abnormal usage are performed by a water monitoring device associated with the water provisioning device.
5. The method of claim 1 further comprising the step of sending the generated alert to one or more registered devices associated with the usage of the water.
6. The method of claim 1 further comprising the steps of comparing the detected usage data with prior usage data associated with prior use of the water by the water provisioning device, and detecting the abnormal usage of the water based on the comparison of the detected usage data with the prior usage data.
7. The method of claim 6, wherein the step of comparing the detected usage data with the prior usage data comprises detecting whether the detected usage data matches a usage pattern associated with the prior usage data.

8. The method of claim 6, wherein the step of comparing the detected usage data with the prior usage data comprises detecting a maximum and/or minimum prior usage value in the prior usage data and comparing the detected maximum and/or minimum prior usage value with maximum and/or minimum values in the detected usage data.
9. The method of claim 6, wherein the step of comparing the detected usage data with the prior usage data is based on an amount the water has been used in a defined usage period.
10. The method of claim 9, wherein the step of comparing comprises the step of comparing a current usage amount of the water with a previously detected usage amount of the water and generating the alert if the current usage amount is below or above a defined threshold associated with the previously detected usage amount.
11. The method of claim 6, wherein the step of comparing the detected usage data with the prior usage data is based on a time that the water was or is being used in a defined usage period.
12. The method of claim 11, wherein the step of comparing comprises the step of comparing a current usage time of the water with a previously detected usage time of the water in the usage period and generating the alert if the current usage time is below or above a defined threshold associated with the previously detected usage time.
13. The method of claim 6 further comprising the step of monitoring and recording the prior usage data.
14. A water monitoring device comprising a processor and memory, wherein the memory comprises software code arranged to cause the processor to implement the method according to claim 1.
15. The water monitoring device of claim 14, wherein the water monitoring device is part of or integrated with a water provisioning device.
16. The water monitoring device of claim 14, wherein the water monitoring device is part of or integrated with one or more of an item of tap ware, a shower unit and a flush unit.
17. A central gateway device in a building management system, wherein the central gateway device comprises a processor and memory, wherein the memory comprises software code arranged to cause the processor to implement the method according to claim 1.

18. A server in communication with a building management system, wherein the server comprises a processor and memory, wherein the memory comprises software code arranged to cause the processor to implement the method according to claim 1.