This disclosure is related to software that responds to consumer usage patterns in order to create more ice. The developed software monitors ice dispenses rather they are crushed or cubed. When a threshold of the number of dispenses within the preset time period has been met, the freezer enters a high demand mode. During high demand mode, the freezer is commanded to run at a colder temperature for a preset period of time. The method described in this disclosure includes setting a threshold for the number of dispenses within a time interval and detecting the number of dispenses that are related to a trigger's activation. The method continues with sending a signal when the number of dispenses surpasses the threshold within the time interval and taking a corrective action that increases the production of ice when the signal is received.
SET A THRESHOLD

DETECT THE NUMBER OF DISPENSES

DID DISPENSES EXCEED THRESHOLD?

SEND A SIGNAL

RECEIVING THE SIGNAL

TAKING CORRECTIVE ACTION

HUMAN INTERFACE OVERRIDE?

ADJUST THRESHOLD

Fig. 2
Fig. 3
DEMAND DRIVEN ICE MODE SOFTWARE

BACKGROUND

[0001] This disclosure relates to the automated boosting of ice production and more particularly, this disclosure is directed towards a method of boosting ice production within a freezer region based on consumer demand. However, this application should not be limited to that particular application and may find application and benefit in related environments and uses. For example, this disclosure may have application in boosting the production of other products in relation to the demand.

[0002] A need exists for a product that responds to consumer usage patterns in order to create more ice without user intervention. Currently in the art, there are methods which are used in order to increase ice production. Generally, energy and performance requirements dictate a freezer temperature of 0 degrees, at the mid-range freezer setting. Although energy and performance is optimized at this point, ice production is not. When more ice is required, there are several modes as “turbo ice” which can be initiated via operator intervention. This operator intervention may be accomplished through an activation switch on a panel. Once turbo ice is implemented, ice production may be boosted by lowering the temperature in the freezer region. Generally, this is done by the controller setting the set point 2 degrees colder for 24 hours. This, in turn, activates the evaporator fan which increases convection across the ice surface and lowers the temperature allowing a supply ice bucket to fill faster.

[0003] However, there exists a need in the art for this process to be automated. Oftentimes a consumer will notice the supply of ice getting low and will activate the turbo ice feature. However, by that point, the supply of ice has already been diminished and there is a danger of running out. Thus, there exists a need for an automated boost in ice production once high demand status has been realized. Furthermore, there is a need for this process to be done simply and inexpensively without adding excess hardware to existing freezer models. This disclosure solves the aforementioned problems and others.

SUMMARY OF THE INVENTION

[0004] A method of responding to consumer usage patterns for an automated ice dispenser positioned within the confines of a freezer region in order to maintain adequate ice production is disclosed.

[0005] An exemplary method comprises setting a threshold for a number of dispenses in a time interval, detecting the number of dispenses which are related to a trigger’s activation, sending a signal when the number of dispenses surpasses the threshold within the time interval and taking a correction action which increases ice production once the signal is received.

[0006] The preferred method may include that the correction action is facilitating convection within the freezer region and/or decreasing the temperature within the freezer region. Furthermore, the number of dispenses may be measured on a weighted scale.

[0007] An exemplary embodiment of an automated ice dispenser system associated within a freezer region comprises a dispensing module that is configured to facilitate ice dispensing and signal a quantitative measurement associated with the amount of ice dispensed. The system also includes a dispensing trigger that is in communication with the dispensing module and is adapted to dispense ice when activated and a temperature module configured to lower the temperature of the freezer region when an activation signal is received. Furthermore, the system may include a logic module which is in communication with the temperature control module and dispensing module and is configured to receive the quantitative measurement communicated from the dispensing module and send the activation signal to the temperature module if the quantitative measurement exceeds a predetermined threshold within a predetermined time interval.

[0008] An exemplary embodiment may also include that the quantitative measurement is a weighted measurement which is related to the amount of time that the dispensing trigger has been activated or the number of trigger activations. An exemplary embodiment may also include a time interval that is a rolling time interval.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 shows a schematic of the freezer region and its associated elements according to one embodiment of the proposed disclosure;

[0010] FIG. 2 shows a flow diagram outlining the method according to one embodiment of the disclosure;

[0011] FIG. 3 illustrates the system components according to an exemplary embodiment of the disclosure.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0012] This disclosure is related to software that responds to consumer usage patterns in order to create more ice. This developed software monitors ice dispenses and takes corrective action when a threshold of dispenses is surpassed within a predetermined period of time. The corrective action may include the freezer running colder for a preset period of time which in turn will activate an evaporator fan which lowers the temperature and increases convection across the ice maker. For example, the freezer which is generally set by the controller may run at 2 set points colder for 24 hours. This colder freezer setting will allow the ice maker to make more ice, replenishing the supply faster.

[0013] Shown in FIG. 1 is a representation of a freezer with an ice maker. As shown, FIG. 1 includes a trigger 101, which is connected to an ice maker 103. The ice maker is situated inside a freezer region 105 and the freezer region is kept frozen by the freezer cycle 107. The freezer cycle includes a compressor 109, heat exchange pipes 111, 121 and an evaporation valve 119. The freezer region also includes an evaporator fan 115. FIG. 1 also shows a human interface 117 which is in communication with a microprocessor 113. This microprocessor 113 is also in communication with the ice maker 103, the evaporator fan 115 and the freezer cycle 107. This is but one embodiment of the system in which the claimed disclosure may be implemented. A variety of other systems exist and will still fit within the spirit of the claims.

[0014] The trigger 101 in this embodiment is adjacent to the ice maker 103. This is so that once the trigger 101 is pressed, the ice may be delivered directly to the consumer. The trigger may come in many forms, including a sensor which senses when a container is in the proper positioning to receive ice. A trigger may also be a button which is pushed by the consumer once the consumer places the container in position. A trigger
may also be automated in order to dispense ice at regular intervals, or whenever the supply gets low.

[0015] The ice maker 103 produces ice and delivers ice when the trigger 101 is activated. The ice maker 103 may deliver crushed ice, cubed ice, ice chips, frost, etc. An ice maker 103 is well known in the art and may work to deliver ice through a variety of methods.

[0016] The ice maker is generally positioned within the freezer region 105. The freezer region remains cold via the freezer cycle 107. The freezer cycle 107 is also well known in the art and generally works through the use of pumps that circulating refrigerant (e.g. Freon) through the compressor 109 as a vapor hits its boiling point. In this form, the vapor exits through the compressor 109 as a super heated vapor. The super heated vapor travels through the condenser and removes the heat by cooling the vapor. The vapor then is condensed into liquid and the saturated liquid travels through an expansion valve 119. The expansion valve 119 is configured to decrease the pressure drastically as it passes through creating a flash vaporization point in the refrigeration cycle. This cold and vaporized refrigerant then travels through the heat exchange tubes 111 and the evaporator 121. At this point, the cold the air is sent out into the freezer region 105 as the evaporator fan 115 circulates the cold air throughout the freezer region. The refrigerant vapor then returns to the compressor 109 beginning the compressor cycle over again.

[0017] This process is generally set at a freezer temperature of 0 degrees. This is a mid-freezer setting which optimizes energy and performance. However, this setting of 0 degrees does not optimize ice production. In order to optimize ice production it would be beneficial if the freezer were set at a colder temperature. This is at least in part because a colder temperature allows the ice maker 103 to create ice a faster rate. However, because energy and performance is optimized at 0 degrees, ideally the freezer will be at a temperature of 0 degrees when ice performance is not required to be booster. One method of boosted the ice production involves human interaction via a human interface 117. The human interface 117 may be a variety of elements. In one embodiment the human interface is a dial which allows for the consumer to dictate the freezer temperature set point. In another embodiment, the human interface is a button that when pressed, decreases the temperature in the freezer region 105 for a predetermined amount of time. Human interface 117 may also be a variety of other elements known in the art, such as a touch screen, a dial, a switch, a lever, etc.

[0018] The human interface 117, evaporation fan 115, ice maker 103, and freezer cycle 107 are all in communication with the microprocessor 113. The microprocessor 113 allows for many interactions with the consumer via the human interface 117. The microprocessor 113 is also capable of tracking ice dispensing via its communication with the ice maker 103. Through this embodiment the microprocessor 113 may allow for corrective action to take place when the demand of the ice maker 103 is high. For example, a customer may dispense ten glasses of ice and via a preset or user activated set point, the ten dispenses in one hour time may constitute high demand. In this case, the microprocessor 113 may turn the freezer into a high demand mode. The high demand mode may trigger running the freezer at a colder temperature for 24 hours. This colder freezer will allow the ice maker to make more ice, replenishing the ice supply.

[0019] The corrective action is not required to be a strict count of the number of times that the trigger 101 has been activated. The microprocessor 113 may use a variety of quantitative methods in order to determine when high demand status is reached. For example, high demand status may be reached if total time of ice dispensing has been 60 seconds within the last two hours. Furthermore, the time period for which high demand status is measured may vary. The time period may also be set through factory specifications or via the human interface 117. In another embodiment, the time period is dynamic or a rolling time period. In this sense high demand status may be affected by only the last hour of time. Furthermore, other embodiments high demand status is related to a weighted system. In this sense, if the trigger was activated within the last minute, the quantitative value which may determine if high demand status is implemented may have a greater affect than when the trigger was activated five minutes ago. There are a variety of methods in which high demand status may implemented and may vary according to application of this disclosure. For example, the set points may vary as well as the time intervals. Furthermore, these factors may vary in accordance with a factory setting implemented by the manufacturer or a consumer setting implemented by a human interface 117.

[0020] Now referring to FIG. 2, a flow chart illustrating one embodiment of the disclosed method is shown. The method begins (at step 201) with setting a threshold. This threshold may be set via the human interface 117, FIG. 1, or through factory specifications. Furthermore, the threshold may be dynamic representing a variety of tie intervals and a variety dispensing mechanisms. For example, time interval may vary from a matter of seconds to days and even weeks. The threshold may represent a percentage of time in which the trigger 101, FIG. 1, has been activated or the number of times that the trigger may have been activated. The threshold may also vary depending on the product dispensed meaning crushed ice may have a different interval than cubed ice and so forth. Furthermore, the threshold may be biased entirely on the amount of product remaining in a supply bin.

[0021] The method continues (at step 203) with detecting the number of dispenses. Depending on how a dispense is measured, this step may be implemented in a variety of manners. For example, a dispense may be a period of time in which the trigger is activated. The dispense may also represent the number of times a trigger is activated. Furthermore, the number of dispenses may vary depending on the time period set. Therefore, if a dispense falls outside of the time period set in the threshold (at step 201) this dispense may not need to be detected.

[0022] The method continues (at step 205) with deciding if the dispense has exceeded the threshold. As noted above, the threshold was set (at step 201) and the dispenses were calculated (at step 203). If the dispense has exceeded the threshold, we continue with step 211. However, if the dispenses did not exceed the threshold, continue with step 207.

[0023] The method continues (at step 207) with deciding if there has been a human interface override. The human interface 117, FIG. 1, may override the system and adjust the threshold if necessary. Furthermore, the human interface may allow for a consumer to do away with this threshold altogether. In this sense, the number of dispenses required to send the system into high demand status may be equal to 0. In this sense, regardless of the amount of time, high demand status is instantaneous and corrective action will be taken regardless of the number of dispenses.
The method continues (at step 209) with adjusting the threshold if there was a human interface override. If the human interface has detected an override which demands the adjustment of the threshold, the next step will require that the threshold be adjusted requiring different criteria for how many dispenses are necessary and/or determining for what length of time dispenses will be measured. The threshold may also be adjusted to redefine what constitutes a dispense. The method would continue back to step 203 if the threshold was not exceeded at step 205.

The method will eventually continue (at step 211) with sending a signal once the dispenses have exceeded the threshold. The signal may be sent from the microprocessor 113, FIG. 1, which signifies that the threshold that was set at 201 and/or adjusted at 209 has been exceeded.

The method continues (at step 213) with receiving the signal and taking corrective action (at step 215). Once the signal is received, corrective action may be taken in order to meet the high demand of ice. Corrective action may include turning on the evaporation fan 115, FIG. 1. This will lower the temperature in the freezer region 105 as well as allow convection across the ice maker 103. This action, in turn, has a tendency to produce ice estimated 20 percent faster. However, corrective action may vary and still fall within the scope of the claims.

The above-described embodiments as shown in FIG. 2, present but one embodiment of the described disclosure. Implementation of various network elements and steps that they perform depend on how the system is used. These functions may be performed by some or all of the various network elements in conjunction or separate from one another. Furthermore, variations of the network elements and steps of the method may exist. Descriptions of these embodiments are not meant to limit the claims but instead show how some of the embodiments of the method may be used.

Now referring to FIG. 3, one embodiment of the software implementing the disclosed method is shown. The system includes the microprocessor 113 which includes the temperature module 301, the dispensing module 303 and the logic module 305. FIG. 3 also shows the human interface 117, the evaporation fan 115 and the trigger 101. The temperature module 301 is configured to lower the temperature of the freezer region 105, FIG. 1, when an activation signal is received. The dispensing module is configured to facilitate ice dispensing and signal a quantitative measurement associated with the amount of ice dispensed. Both of these modules are in communication with the logic module 305. The logic module is configured to receive a quantitative measurement from the dispensing module 303. If the quantitative measurement exceeds a predetermined threshold within a predetermined time interval the logic module in one embodiment will send an activation signal to the temperature module 301. The logic module is also in communication with the human interface 117. The human interface 117 may be used in order for a consumer to override the current system of logic and implement the parameters which allow for the activation signal to be sent to the temperature module 301. The human interface may signal to the logic module that no criteria needs to be met and that the temperature module 301 should activate the evaporation fan 117 effectively taking a corrective action due to high demand.

Generally the dispensing module 303 which is in communication with the trigger 101 will calculate a quantitative measurement. The quantitative measurement is in turn sent to the logic module 305 so that it may make a determination as to whether high demand status has been implemented and that correction action should be taken. The quantitative measurement collected by the dispensing module 303 may be in a variety of forms. It may include a percentage of time that the trigger 101 has been depressed. Quantitative measurement may also include a weighted scale. In this form, the more recently the trigger 101 has been depressed, the more weight will be given to that event.

The above description merely provides a disclosure of some of the embodiments which may be used and implemented throughout the system. The above-provided description is not intended for purposes of limiting the claims. As such, this description is not limited only to the above-described embodiments, rather, one skilled in the art may conceive alternative embodiments which fall within the scope of the claims.

1. A method for automated boosting of ice production within a freezer region based on demand comprising:
   setting a threshold for a number of dispenses in a time interval;
   detecting said number of dispenses which are related to a trigger’s activation;
   sending a signal when said number of dispenses surpasses said threshold within said time interval; and
   taking a corrective action that increases the ice production when said signal is received.
2. The method according to claim 1, wherein said corrective action includes facilitating convention.
3. The method according to claim 1, wherein said corrective action includes decreasing the temperature within said freezer region.
4. The method according to claim 1, wherein said time interval is rolling time interval.
5. The method according to claim 1, wherein said number of dispenses is measured on a weighted scale.
6. The method according to claim 1, further comprising sending said signal via a human interface.
7. The method according to claim 1, wherein detecting said number of dispenses is facilitated via communication between a dispense trigger and a central controller.
8. An automated ice dispenser system associated within a freezer region comprising:
   a dispensing module that is configured to facilitate ice dispensing and signal a quantitative measurement associated with the amount of ice dispensed;
   a dispensing trigger that is in communication with said dispensing module and is adapted to dispense ice when activated;
   a temperature module configured to lower the temperature of the freezer region when an activation signal is received; and
   a logic module in communication with said temperature control module and said dispensing module configured to receive said quantitative measurement communicated from said dispensing module and send said activation signal to said temperature module if said quantitative measurement exceeds a predetermined threshold within a predetermined time interval.
9. The system according to claim 8, wherein lowering the temperature is implemented by activating an evaporation fan adapted to increase convection.
10. The system according to claim 8, wherein said quantitative measurement is a weighted measurement.
11. The system according to claim 10, wherein said weighted measurement is dependent upon the amount of time that said dispensing trigger has been activated.

12. The system according to claim 8, wherein said quantitative measurement is a count of the number of activations.

13. The system according to claim 8, wherein said predetermined time interval is a rolling time interval.

14. The system according to claim 8, further comprising a human interface configured to allow for manual adjustment of said predetermined threshold.

15. The system according to claim 8, further comprising a human interface configured to allow for manual adjustment of said predetermined time interval.

16. A method of responding to consumer usage patterns for an automated ice dispenser positioned within the confines of freezer region in order to maintain adequate ice production comprising:

determining a lower bound threshold, that when surpassed will signal that said automated ice dispenser is in high demand status; and activating an evaporation fan configured to increase convention and lower the temperature within said freezer when said automated ice dispenser is in high demand status.

17. The method according to claim 16, wherein said threshold is a predetermined number of dispenses per a predetermined time interval.

18. The method according to claim 16, wherein said threshold is a percentage of time that the dispenser has been active during a time interval.

19. The method according to claim 18, wherein said time interval is manually regulated via a human interface.

20. The method according to claim 18, wherein said time interval is dynamic.

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