In a stove (100) with a burner area (102), a burner (104) within the burner area (102), and either a gas supply line (144a) or an electrical line (144b), the system monitors conditions in or around the burner area (102), the burner (104) within the burner area (102), or the space around the stove. If an unsafe condition is detected, such as an unattended burner condition or an open burner condition, the system makes a safety determination regarding whether or not to activate an alarm or shut off the gas supply line or electrical line.
FIG. 2

Start Range

Detect Pressure

Contact Pressure?

Enable Gas/Electric Supply

Measure Range Heat Level

Above Range's "On" Temp?

Motion in Area?

Max Time Elapsed?

Generate Audible, Visual, and Remote Warnings

Disable Gas/Electric Supply

Smoke Condition Detected

Max Interval Time Elapsed?

User Reset Stovetop/Range Controls

Disable Audible, Visual, and Remote Warnings
STOVETOP/RANGE WARNING AND CONTROL FIRE SAFETY SYSTEM

CROSS-REFERENCE TO RELATED PATENT APPLICATION

[0001] This application claims the benefit of U.S. provisional patent application Ser. No. 60/948,970 filed Jul. 10, 2007, which we incorporate by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Technical Field

[0003] The present invention relates to the operation of stoves, and more particularly to a set of safety improvements whereby various stove conditions are sensed, various safety determinations are made based on the conditions, and various alarms and shutoffs are activated based on the safety determinations.

[0004] 2. Discussion of Related Art

[0005] According to national fire safety information the majority of household fires are caused by unattended cooking.

[0006] U.S. Pat. No. 5,073,701 discloses an arrangement in a range or cooking hob capable of disconnecting power to a hot plate or oven.

[0007] U.S. Pat. No. 6,303,912 discloses a self-contained induction heating appliance with a safety feature capable of reducing or removing power.

[0008] U.S. Pat. No. 7,183,521 discloses an oven rack sensor used to detect the presence or absence of a rack for use in self-cleaning ovens, and provides for both visible and audible alarms.

[0009] U.S. Pat. No. 7,381,930 discloses a convection oven control system with an alarm point determination used to communicate visible and audible reminders.


[0011] Therefore, a need exists for improvements in the detection, reporting, and elimination of unsafe stove conditions related to unattended cooking.

SUMMARY OF THE INVENTION

[0012] In a stove including a burner area, a burner within the burner area, and either a gas supply line or an electrical line, the system monitors conditions in and around the burner area, the burner within the burner area, or the space around the stove. If an unsafe condition is detected, such as an unattended burner condition or an open burner condition, the system makes a safety determination regarding whether or not to activate an alarm or shut off the gas supply line or electrical line.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. 1 is a functional block diagram of an exemplary embodiment of the Stovetop/Range Warning and Control Fire Safety System.

[0014] FIG. 2 is a typical decision tree of embedded software or logic in an exemplary embodiment of the Stovetop/Range Warning and Control Fire Safety System.

DETAILED DESCRIPTION OF THE INVENTION

[0015] FIG. 1 is a functional block diagram of an exemplary embodiment of the Stovetop/Range Warning and Control Fire Safety System.

[0016] Referring to FIG. 1, a stove (100) may include a stovetop/range (110), a sensor (170), and a control unit (10). The stove may be supplied by a gas supply line (144a) or electrical line (144b). In addition, the stove may be capable of generating alarm outputs (120) and a shutoff output (130).

[0017] In this embodiment, the stovetop/range (110) has four burners (104). Each burner may be associated with an area around the burner (102). The sensor (170) may include a heat sensor (61), a pressure sensor (71) used to detect the presence of cookware in a burner area, a motion sensor (72), and a smoke sensor (73). The alarm outputs (120) may include an audible alarm output (121), a visible alarm output (122), and a network alarm output (123). The shutoff output (130) may be either a gas supply shutoff output (134a) or an electrical shutoff output (134b) connected to a gas supply shutoff (44a) or an electrical shutoff (44b). Separate shutoffs can be provided for each burner.

[0018] In this embodiment, the sensor (170) monitors heat using the heat sensor (61), presence of cookware using the pressure sensor (71), motion in the area of the stove using the motion sensor (72), and detection of smoke using the smoke sensor (73). The control unit (10) may be programmable through user I/O connectors and ports (150), which could include a 10/100/1G Ethernet connection port, USB interface, or serial port. The control unit (10) may receive input from the sensor (170), use that input to make a safety determination, and based on that safety determination, the control unit may activate alarm outputs (120) and a shutoff output (130).

[0019] In this example embodiment, the control unit (10) houses and combines different system components that include the Controller (30), Input functions (70), Output functions (40), Analog to Digital (A/D) conversion circuitry (60), a power supply (50), and timing circuitry (20). The control unit (10) accepts the output of the different system sensors and provides control to the different warning devices while also providing user I/O connectors and ports.

[0020] The timing circuit (20) generates clocks used by the Controller (30) for use in counters and data collection circuits. The clocks allow for various delays and time measurements that may be implemented in the system (as explained with respect to FIG. 2 below). The time measurements and delays generated by the Controller (30) may include, among others, an unattended area delay, an open flame/burner time measurement, a gas/electric supply turn-off delay, a burner area pressure detection time measurement, and alarm time/warning indicator duration times.

[0021] The Controller (30) may be any device or logic circuitry that is used to control the functions and actions of the system. The term Controller thus includes microcontrollers, DSPs (Digital Signal Processors), micro-computers, FPGAs (Field Programmable Gate Arrays), and any logic that can perform the desired functions.

[0022] The Controller (30) provides the intelligence to the system and provides decision making capability. The Controller (30) receives and integrates the signals from the vari-
ous sensors and makes decisions of safe/unsafe conditions. If unsafe conditions are present, a warning sounds and the controller (30) removes the dangerous condition by turning power off to the stovetop/range by controlling the gas shutoff valve (44a) or electrical shutoff switch (44b). The Controller (30) incorporates different decision trees (FIG. 2) via software, firmware, or logic circuitry for determination of safe/unsafe conditions. By connecting to an external computer through the 10/100/1G Ethernet port, USB port, serial port, or a user I/O interface, the unit may be programmed to user settable delays and options.

[0023] The Controller (30) generates Network Alarms (43) that can be transmitted over the internet, or sent as messages over a local area network for remote monitoring by an alarm or monitoring system. Even though the local hazard will be removed by the system by turning off the power (gas or electric) it gives the system in large apartment complexes the capability of being networked so that a central monitoring device can be made aware of a hazard at a specific unit. In elderly care homes and assisted living units this can be used, along with other devices, to monitor the possible need of assistance in one of the units.

[0024] The Stovetop/Range Warning & Control Fire Safety System uses various outputs to provide the warning and safety controls. These outputs include the gas supply shutoff (44a) or the electrical shutoff (44b) that turn off the gas or electricity to each burner of the stovetop/range. By turning off the gas or electricity the danger of an unmonitored open flame or heating element can be removed thus eliminating the dangerous condition.

[0025] In addition to the gas supply shutoff (44a) and electrical shutoff (44b), various alarm functions are provided by the system to output warning indications that alert the stovetop/range user of unsafe conditions. These warning functions can include both local and remote alarm.

[0026] The Audible Alarms (41) provide an audible indication to warn the user that a dangerous condition exists at the stovetop/range area. The audio alarm also allows visually handicapped persons to be made aware of the dangerous condition at the stovetop/range.

[0027] The Visible alarms (42) provide a visible indication to warn the user that a dangerous condition exists at the stovetop/range area. The visible alarm also allows aurally handicapped persons to be made aware of the dangerous condition at the stovetop/range.

[0028] Both the audible alarms (41) and visible alarms (42) besides being locally present can be sent to a remote location such as a bedroom, a bathroom, or an outdoor patio/yard area to signal the presence of a dangerous condition.

[0029] The system also provides the ability, in cases of large apartment complexes or senior citizen homes, to connect to an area network and send Network Alarm (43) messages that can alert a central computer to an unsafe condition existing at one of the units. This is accomplished by providing a 10/100/1G Ethernet connection port that allows connection to the local network. The devices can be configured on installation to provide unique addresses and status for each unit. By using an optional Web browser interface that is embedded in the Controller (30) code it allows the forwarding of the unsafe condition to the user via pager, phone, Ethernet, or other transmitting device. It also allows the system to be connected to an alarm system or other remote monitoring service.

[0030] The power supply (50) provides the control unit (10) with voltages for the operation of the system devices. It also provides battery backup power to the control unit in case of power outages.

[0031] The analog-to-digital converter (60) receives analog data from the heat sensor (61) and converts it into a digital format that can be read by the Controller (30). The heat sensor (61) provides a way to monitor the temperature of the burner area (104). Its output is fed to the Controller (30) for decision making. Besides on/off conditions the sensor also allows the monitoring of an over-temperature condition by providing precise temperature measurements.

[0032] The system input functions (70) provide inputs to the control unit (10) and Controller (30) to determine stovetop/range conditions as well as local area conditions. These conditions include attended/non-attended indications, open flame/heating element condition, over-temperature conditions, temperature measurements, smoke detection, and burner area pressure detection.

[0033] The Pressure Sensor (71) in each burner provides the ability to monitor whether a cooking vessel is in contact with the burner/heating element. This sensor is used to detect a dangerous open flame/heating element condition. A delay can be included in the system to allow the unit to temporarily remove the cooking utensil from the burner and place it back without the flame or power to the burner being turned off. If the cooking utensil is removed past the predetermined time period then the power supply (gas or electric) to that burner is turned off to eliminate a fire hazard.

[0034] The motion sensor (72) detects whether the stovetop/range area has been left unattended. The sensor allows a time-out function to be implemented that automatically turns off the stovetop/range (110) if it has been left unattended after a predetermined lapse of time. When there is activity in the stovetop/range area, the automatic shutoff is disabled to prevent stove/burner from accidentally being turned off.

[0035] The smoke sensor (73) detects the presence of smoke in the stovetop/range area indicating a possible fire condition. Upon detection the sensor allows a time-out function to be implemented that automatically turns off the stovetop/range (110) to eliminate the danger and alert the user of the condition.

[0036] Once the gas/power is turned off the user must turn off the stovetop/range knob to reset all functions and allow the stovetop/range (110) to return to normal operation.

[0037] In this example embodiment, each burner (104) is associated with a dedicated gas supply shutoff (44a) or electrical shutoff (44b). In an alternate embodiment, all burners (104) of the stovetop/range (110) may share a gas supply shutoff (44a) or electrical shutoff (44b).

[0038] In another example embodiment, aftermarket application may be accomplished with an ancillary control unit that may be integrated to a stovetop/range with all other functions described above. Safety shut-off for an electric stovetop/range could include some type of voltage interrupt adapter provided between an electrical power cord of stovetop/range and an electrical outlet. For gas stovetop/range a solenoid valve could be located in a proprietary gas line adapter that operates to shut off the gas supply.

[0039] FIG. 2 is a typical decision tree or flowchart of embedded software, firmware, or logic in an exemplary embodiment of the Stovetop/Range Warning and Control Fire Safety System.
Referring to FIG. 2, a number of steps are laid out. In some steps, the system may take some action. In other steps, the system can make a decision whose outcome may determine subsequent actions. In the normal operation of the system, a number of decisions may be made, and based on the result of a decision, the system may loop back and pass through steps in the decision tree that the system has already passed through before, which may include additional iterations of the same decision. That is, in normal operation, the system may make many passes through, or cycle through, a particular set of steps of the decision tree, effectively "polling" a condition corresponding to a particular decision.

For example, in some of the steps in which the system makes a decision, the decision may involve comparison of an elapsed time to a maximum time, or maximum time interval, or maximum delay time. Based on the result of such a decision, the system may loop back and ultimately pass through additional iterations of the same decision involving comparison to the same maximum delay time. Thus, the system may repeatedly test against an elapsed time over many passes through the decision tree to see whether the elapsed time exceeds a maximum delay time.

In an example showing the normal operation of the decision tree in the exemplary embodiment, a stovetop/range user wishing to boil a kettle of water places the water-filled kettle on the stovetop/range and remains in the area around the stovetop/range, waiting for the kettle to boil. In this example, in step 202, the user starts the stovetop/range, for example by turning on one of the burners. In step 204, the system can then measure pressure of the kettle on the burner of the stovetop/range. In step 206, the system can decide whether the measured pressure exceeds a sufficient contact pressure. If the sufficient contact pressure is exceeded, then in step 208 the system may enable the gas or electric supply. Next, in step 210, the system may measure a heat level of the stovetop/range. In step 212, the system may decide whether the measured heat level exceeds an "On" temperature of the stovetop/range. If the "On" temperature is not exceeded, the system may return to step 204 in preparation for another pass through the decision tree. If the "On" temperature is exceeded, then the system may detect motion in the area around the stovetop/range. In step 214, if there is motion in the area around the stovetop/range, the system may return to step 204 in preparation for another pass through the decision tree.

The system then operates normally, without activating any alarms or shutoffs, during the time in which the burner heats and boils the kettle of water.

In an example showing an alternate operation involving step 206, a stovetop/range user wishes to boil a kettle of water, but after turning the burner on, forgets to place the cooking utensil on the burner area. In this example, the system may pass through the decision tree in the same manner as under normal operation until step 206. Then, in step 206, if a sufficient contact pressure is not exceeded, the system may proceed to step 308 and may test whether a maximum time—in this example, a temporary removal delay time—has elapsed. If the temporary removal delay time has not elapsed, the system may return to step 204.

In this example, since the user has forgotten to place the cooking utensil on the burner area, the system may make no number of passes through the decision tree until the temporary removal delay time has elapsed by the time of some future pass through step 308. After that, in step 310, the system may subsequently disable the gas or electric supply (which may be done by activating an appropriate shutoff output), and the system may return to step 204.

In another example showing an alternate operation involving step 206, a stovetop/range user in the midst of normal stovetop/range operation may temporarily remove a cooking utensil from a burner area. In this example, the system may pass through the decision tree in the same manner as under normal operation until step 206 of the pass through the decision tree following the removal of the cooking utensil. Then, in step 206, a sufficient contact pressure is not exceeded, and the system may proceed to step 308 to test whether the temporary removal delay time has elapsed.

In this example, since the user has merely temporarily removed the cooking utensil from the burner area, and returns the cooking utensil to the burner area before the temporary removal delay time elapses, the temporary removal delay time will not elapse in any subsequent pass through the decision tree, and the system will therefore not reach step 310 and disable the gas or electric supply, but may simply continue returning to step 204. In the pass through the decision tree following the return of the cooking utensil, upon reaching step 206, a sufficient contact pressure may be exceeded, and the system will no longer proceed to step 308, but may instead proceed to step 208, as would be proper for normal operation.

In yet another example showing an alternate operation involving step 206, a user in the midst of normal stovetop/range operation may remove a cooking utensil from the burner area and not return it, leaving an unattended burner. As in the previous example, the system can pass through the decision tree in the same manner as under normal operation until step 206 of the pass through the decision tree following the removal of the cooking utensil. Then, in step 206, a sufficient contact pressure is not exceeded, and the system can proceed to step 308 and may test whether the temporary removal delay time has elapsed. If the temporary removal delay time has not elapsed, the system can return to step 204.

However, in this example, since the user will not be returning the cooking utensil to the burner area, the temporary removal delay time will elapse in some subsequent pass through the decision tree. In the pass through the decision tree following the elapse of the temporary removal delay time, in step 310, the system can subsequently disable the gas or electric supply (which may be done by activating an appropriate shutoff output), and the system may return to step 204.

In an example showing an alternate operation involving step 214, a stovetop/range user wishes to boil a kettle of water, but after beginning to cook, may temporarily leave the area around the stovetop/range. In this example, the system passes through the decision tree in the same manner as under normal operation until step 214 of the pass through the decision tree after the user leaves the area around the stovetop/range. Then, in step 214, motion in the area around the stovetop/range is not detected, and the system can proceed to step 416 and test whether another maximum time—in this example, an unattended area delay time—has elapsed. If the unattended area delay time has not elapsed, the system may return to step 204.

In this example, since the user has merely temporarily left the area around the stovetop/range, the unattended area delay time will not elapse in any subsequent pass through the decision tree, and the system will therefore not reach step 418 and generate warnings, but may simply continue returning to step 204. In the pass through the decision tree following the user's return to the area around the stovetop/range, upon
reaching step 214, motion in the area around the stovetop/range will be detected, and the system will no longer proceed to step 416, but can instead return to step 204, as would be proper for normal operation.

[0051] In another example showing an alternate operation involving step 214, a stovetop/range user wishes to boil a kettle of water, but after beginning to cook, leaves the area around the stovetop/range and doesn’t return. As in the previous example, the system passes through the decision tree in the same manner as under normal operation until step 214 of the pass through the decision tree after the user leaves the area around the stovetop/range. Then, in step 214, motion in the area around the stovetop/range is not detected, and the system proceeds to step 416 to test whether the unattended area delay time has elapsed. If the unattended area delay time has not elapsed, the system can return to step 204.

[0052] However, in this example, since the user will not be returning to the area around the stovetop/range, the unattended area delay will elapse in some subsequent pass through the decision tree. In the pass through the decision tree following the elapse of the unattended area delay time, in step 418, the system can generate alarms (visible, audible, or network alarms, distributed locally or remotely), and the system can proceed to step 420. In step 420, the system tests whether yet another maximum time—such as, gas/electric supply turnoff delay time—has elapsed. If the gas/electric supply turnoff delay time has not elapsed, the system can return to step 210.

[0053] Again, since the user will not be returning to the area around the stovetop/range, the gas/electric supply turnoff delay will elapse in some subsequent pass through the decision tree. In the pass through the decision tree following the elapse of the gas/electric supply turnoff delay time, in step 522, the system can subsequently disable the gas or electric supply (which may be done by activating an appropriate shutoff output). At some future time, in step 524, a user may reset the stovetop/range controls, after which in step 526 the system can disable warnings (visible, audible, or network alarms, distributed locally or remotely) and can return to step 202, awaiting a user’s subsequent starting of the stovetop/range.

[0054] In yet another example showing an alternate operation involving step 214, a stovetop/range user wishes to boil a kettle of water, and leaves the area, returning after the generation of an alarm but before the disabling of the gas or electric supply. The system passes through the decision tree in the same manner as in the previous example until step 214 of the pass through the decision tree after the user returns to the area around the stovetop/range. Then, in step 214, motion in the area around the stovetop/range is detected, and the system can return to step 204.

[0055] In an example showing an alternate operation involving step 522, a smoke condition arises in the area of the stovetop/range that can indicate a fire hazard. In step 620, the system detects a smoke condition, and proceeds to step 522, where the system can subsequently disable the gas or electric supply (which may be done by activating an appropriate shutoff output). At some future time, in step 524, a user may reset the stovetop/range controls, after which the system can disable warnings (visible, audible, or network alarms, distributed locally or remotely) and can return to step 202, awaiting a user’s subsequent starting of the stovetop/range.

[0056] Those skilled in this art can understand that the concepts described herein may be changed and modified in various ways. The scope of the invention is intended to include such changes and modifications in various applications. For example, step 206 of FIG. 2 may involve comparision against multiple possible temperatures: a relatively high temperature indicating a more dangerous condition, and a relatively low temperature indicating a more safe condition, perhaps reflective of a pot simmering in normal operation. Thus, specific realizations of the invention should fall within the scope of the claims.

[0057] The invention has been particularly shown and described with reference to exemplary embodiments. However, the scope of the invention is not limited to the disclosed embodiments. On the contrary, it will be understood by those skilled in the art that various changes and modifications of the invention, using presently known or future technologies and equivalents, fall within the true spirit and scope of the invention. The scope of the following claims, therefore, should be accorded the broadest reasonable interpretation so as to encompass all such modifications and similar arrangements.

1. A stove comprising a burner area, a burner within the burner area, a gas supply line or electrical line, a sensor operative to monitor at least one of a condition in or around the burner area, the burner within the burner area, or an area around the stove, a control unit operative to receive input from the sensor, and at least one alarm output or shutoff output operative to initiate an alarm or shut off the gas supply line or electrical line when activated by the control unit; and wherein the control unit is operative to make a safety determination, based on the input from the sensor, whether to activate the alarm output or shutoff output.

2. The stove of claim 1, wherein the sensor comprises a heat sensor and a pressure sensor, and wherein the heat sensor is operative to measure a temperature condition of the burner area or the burner within the burner area, the pressure sensor is operative to measure a pressure condition of the burner area to detect the presence of cookware at the burner, and the control unit is operative to make a safety determination regarding an open burner condition based on input from the heat sensor and pressure sensor.

3. The stove of claim 1, wherein the sensor comprises a heat sensor and a motion sensor, and wherein the heat sensor is operative to measure a temperature condition of the burner area or the burner within the burner area, the motion sensor is operative to measure an attendance condition of the area around the stove, and the control unit is operative to make a safety determination regarding an unattended burner condition based on input from the heat sensor and the motion sensor.

4. The stove of claim 1, wherein the sensor comprises a heat sensor, and wherein the heat sensor is operative to measure a temperature condition of the burner area or the burner within the burner area and the control unit is operative to make a safety condition regarding an over-temperature condition based on input from the heat sensor.
5. The stove of claim 1, wherein the sensor comprises a smoke sensor, and wherein the smoke sensor is operative to measure a smoke condition of burner area, the burner within the burner area, or the area around the stove, and the control unit is operative to make a safety determination regarding a possible fire condition based on input from the smoke sensor.

6. The stove of claim 1, wherein the control unit, upon making a safety determination, is operative to activate a gas supply shut off output or an electrical shut off output.

7. The stove of claim 1, wherein the control unit, upon making a safety determination, is operative to activate an audible alarm output, a visible alarm output, or a network alarm output, and wherein the activated alarm may be present locally or remotely.

8. The stove of claim 1, wherein the control unit comprises:
   a controller operative to make a safety determination;
   a timing circuit operative to provide clocks to the controller;
   an output interface operative to transmit the alarm output or shut off output;
   a power supply operative to provide power to the control unit;
   an analog to digital converter to convert data from the sensor from an analog representation to a digital representation and provide the converted data to the controller; and
   at least one input interface to provide sensor data to the controller.

9. The stove of claim 1, wherein the control unit comprises user I/O connectors and ports to access programmable user delays and options.

10. The stove of claim 1, wherein the control unit comprises a web browser interface to access programmable user delays and options.

11. The stove of claim 1, wherein the control unit comprises code allowing the forwarding of unsafe condition information via pager, phone, Ethernet, or other transmitting device.

12. A method for improving the safety of a stove having a burner area, a burner within the burner area, and a gas supply line or electrical line, comprising:
   monitoring at least one of a condition in or around the burner area, the burner within the burner area, or an area around the stove;
   making a safety determination whether to activate at least one alarm output or shut off output; and
   activating the alarm output or shutting off the gas supply line or electrical line based on the safety determination.

13. The method for improving the safety of a stove of claim 12, further comprising:
   measuring a temperature condition of the burner area or the burner within the burner area,
   measuring a pressure condition of the burner area to detect the presence of cookware at the burner, and
   making a safety determination regarding an open burner condition based on the measured temperature condition and measured pressure condition.

14. The method for improving the safety of a stove of claim 12, further comprising:
   measuring a temperature condition of the burner area or the burner within the burner area,
   measuring an attendance condition of the area around the stove, and
   making a safety determination regarding an unattended burner condition based on the measured temperature condition and the measured attendance condition.

15. The method for improving the safety of a stove of claim 12, further comprising:
   based upon the safety determination, activating a gas supply shut off output or an electrical shut off output and activating an audible alarm output, a visible alarm output, or a network alarm output, wherein the activated alarm may be present locally or remotely.

16. An apparatus to improve the safety of a stove having a burner area, a burner within the burner area, and a gas supply line or electrical line, the apparatus comprising:
   a sensor operative to monitor at least one of a condition in or around the burner area, the burner within the burner area, or an area around the stove, comprising a heat sensor and a second sensor;
   a control unit operative to receive input from the sensor;
   and
   at least one alarm output or shut off output operative to initiate an alarm or shut off the gas supply line or electrical line when activated by the control unit; and
   wherein the control unit is operative to make a safety determination, based on the input from the sensor, whether to activate the alarm output or shut off output.

17. The apparatus to improve the safety of a stove of claim 16, wherein the sensor comprises a heat sensor and a pressure sensor, and wherein the heat sensor is operative to measure a temperature condition of the burner area or the burner within the burner area, the pressure sensor is operative to measure a pressure condition of the burner area to detect the presence of cookware at the burner, and the control unit is operative to make a safety determination regarding an open burner condition based on input from the heat sensor and pressure sensor.

18. The apparatus to improve the safety of a stove of claim 16, wherein the sensor comprises a heat sensor and a motion sensor, and wherein the heat sensor is operative to measure a temperature condition of the burner area or the burner within the burner area, the motion sensor is operative to measure an attendance condition of the area around the stove, and the control unit is operative to make a safety determination regarding an unattended burner condition based on input from the heat sensor and the motion sensor.

19. The apparatus to improve the safety of a stove of claim 16, wherein the control unit comprises user I/O connectors and ports to access programmable user delays and options.

20. The apparatus to improve the safety of a stove of claim 16, wherein the control unit comprises a web browser interface to access programmable user delays and options.