Claims:

1. A method of detecting a condition in an exhaust ventilation system including an exhaust hood, the method comprising:

receiving, at a control module, an exhaust air temperature signal representing a temperature of the exhaust air in a vicinity of the exhaust hood, the exhaust air temperature signal being generated by a temperature sensor;

receiving, at the control module, a radiant temperature signal representing a temperature of a surface of a cooking appliance that generates the exhaust air, the radiant temperature signal being generated by a radiant temperature sensor;

receiving, at the control module, a pressure signal representing the pressure in the hood;

regulating a flow of exhaust to a first flow rate associated with an idle status of the cooking appliance responsively to the received exhaust air temperature signal, the received radiant temperature signal, and the received pressure signal; and

regulating a flow of exhaust to a second high flow rate, higher than the first low flow rate, associated with an high load cooking status of the cooking appliance responsively to the received exhaust air temperature signal, the received radiant temperature signal, and the received pressure signal; and

regulating a fire suppression mechanism responsively to at least one of the received exhaust air temperature signal, the received radiant temperature signal, and the received pressure signal.

2. The method of claim 1, further comprising, using said control module, and responsively to said radiant temperature, exhaust temperature, and a further signal, distinguishing a flare-up from a grill from a fire and regulating a flow rate of the exhaust and/or regulating a fire suppression mechanism responsively to the distinguishing.

3. The method of claim 2, wherein the further signal includes an optical luminance signal.

4. The method of claim 2 or 3, wherein the distinguishing includes filtering an optical or radiant temperature signal so as to detect a temporal fluctuation and employing machine classification to recognize distinguish at least two cooking states and a fire state.

5. The method of claim 1, or 4, wherein the fire suppression mechanism is

activated in response to the calculation by said control module of a total heat gain above the predetermined magnitude threshold combined with a duration of the heat gain being above a predetermined duration threshold.

6. The method of claim 1 or 5, wherein said control module includes a processor and a memory with a program stored in the memory adapted for implementing a machine classification algorithm and to control the exhaust flow and fire suppression mechanism responsively to a classifier output thereof.

7. The method of claim 1 or 6, wherein the pressure signal is indicative of a flow rate through the exhaust hood.

8. The method of claim 7, wherein the regulating a flow of exhaust includes regulating a flow of exhaust responsively to said pressure signal.

9. A method of responding to a condition in an exhaust ventilation system including an exhaust hood, the method comprising:

regulating a flow of exhaust through a ventilation component responsively to a first sensor adapted to detect a fume load from a cooking appliance; and

detecting a fire condition responsively to said first sensor and regulating a fire suppression mechanism responsively to the detecting;

the regulating and detecting being performed by a controller configured to receive signals from the sensor.

10. The method of claim 9 wherein the ventilation component includes a cooking exhaust hood.

11. The method of claim 9 or 10, wherein the controller includes a digital processor adapted for distinguishing first and second fume load states and for generating a command signal respective to each of the exhaust flow rates.

12. The method of claim 11, wherein the digital processor implements a machine classification algorithm.

13. The method of claim 11 or 12, wherein the digital processor implements a machine classification algorithm generated from a supervised learning.

14. The method of claim 11, wherein the digital processor implements an algorithm that is responsive to whether said first signal is temporally fluctuating or not and

for regulating the flow of exhaust responsively thereto.

15. The method of claim 9 or 11, wherein said first sensor includes a radiant temperature sensor or an air temperature sensor.

16. The method of claim 15 wherein the first sensor includes a camera.

17. The method of claim 16, wherein the camera is able to image in infrared wavelengths.

18. The method of claim 16, wherein the camera is able to image in optical wavelengths.

19. The method of claim 16, wherein the camera is able to image in infrared and optical wavelengths.

20. The method of any of claim 9 through 19, further comprising low pass filtering the signal from the first sensor, wherein and said regulating is responsive both the signal from the first sensor and a result of the low pass filtering.

21. A method of detecting a condition in an exhaust ventilation system including an exhaust hood, the method comprising:

receiving, at a control module, an exhaust air temperature signal representing a temperature of the exhaust air in a vicinity of the exhaust hood, the exhaust air temperature signal being generated by a temperature sensor;

receiving, at the control module, a radiant temperature signal representing a temperature of a surface of a cooking appliance that generates the exhaust air, the radiant temperature signal being generated by a radiant temperature sensor;

receiving, at the control module, a pressure signal representing the pressure in the hood;

determining in the control module a state of the cooking appliance responsively to the received exhaust air temperature signal, the received radiant temperature signal, and the received pressure signal; and

determining a fire condition in response to the determined appliance state.

22. The method of claim 21, wherein the cooking appliance state includes a cooking state, an idle state, an off state, a flare-up state, and a fire state and the control

modules is configured to generate a respective control signal for each of the detected states and the method includes regulating an exhaust flow rate and a fire suppression mechanism responsively to said respective control signals.

23. The method of claim 21, further comprising, using said control module, and responsively to said radiant temperature, exhaust temperature, and a further signal, distinguishing a flare-up from a grill from a fire and regulating a flow rate of the exhaust and/or regulating a fire suppression mechanism responsively to the distinguishing.

24. The method of claim 23, wherein the further signal includes an optical luminance signal.

25. The method of claim 23, wherein the distinguishing includes filtering an optical or radiant temperature signal so as to detect a temporal fluctuation and employing machine classification to recognize distinguish at least two cooking states and a fire state.

26. The method of claim 21, wherein the fire suppression mechanism is activated in response to the calculation by said control module of a total heat gain above the predetermined magnitude threshold combined with a duration of the heat gain being above a predetermined duration threshold.

27. The method of claim 21 or 26, wherein said control module includes a processor and a memory with a program stored in the memory adapted for implementing a machine classification algorithm and to control the exhaust flow and fire suppression mechanism responsively to a classifier output thereof.

28. A system configured to implement any of the foregoing methods.

29. A system including an exhaust hood configured to implement any of the foregoing methods.

30. A system including an exhaust hood and a controller configured to implement any of the foregoing methods.

31. A combined fire suppression and exhaust flow control system, comprising:

a controller with at least one first sensor, the controller being configured to generate a exhaust flow rate command signal for controlling an exhaust flow rate responsively to a signal from the first sensor;

the controller being further configured to generate a fire suppression command signal for controlling a fire suppression mechanism responsively to a signal from the first sensor.

32. The system of claim 31, further comprising an exhaust fan-speed drive connected to the controller so as to receive the exhaust flow rate command signal.

33. The system of claim 31 or 32, wherein the first sensor

34. The system of claim 31 or 32, further comprising a cooking exhaust hood.

35. The system of claim 31 or 32, wherein the controller includes a digital processor adapted for distinguishing first and second fume load states and for generating a command signal respective to each of the exhaust flow rates.

36. The system of claim 35, wherein the digital processor implements a machine classification algorithm.

37. The system of claim 36, wherein the digital processor implements a machine classification algorithm generated from a supervised learning.

38. The system of claim 36, wherein the digital processor implements an algorithm that is responsive to whether said first signal is temporally fluctuating or not and for regulating the flow of exhaust responsively thereto.

39. The system of any of claims 34 to 38, wherein said first sensor includes a radiant temperature sensor or an air temperature sensor.

40. The system of any of claims 34 to 38, wherein the first sensor includes a camera.

41. The system of claim 40, wherein the camera is able to image in infrared wavelengths.

42. The system of claim 40, wherein the camera is able to image in optical wavelengths.

43. The system of claim 40, wherein the camera is able to image in infrared and optical wavelengths.

Claims

1. A method comprising:

receiving, at a control module, an exhaust air temperature signal representing a temperature of the exhaust air in a vicinity of an exhaust hood, the exhaust air temperature signal being generated by a temperature sensor;

receiving, at the control module, a radiant temperature signal representing a temperature of a surface of a cooking appliance that generates the exhaust air, the radiant temperature signal being generated by a radiant temperature sensor;

receiving, at the control module, a pressure signal representing the pressure in the hood;

regulating a flow of exhaust to a first flow rate associated with an idle status of the cooking appliance responsively to the received exhaust air temperature signal, the received radiant temperature signal, and the received pressure signal; and

regulating a flow of exhaust to a second flow rate, which is higher than the first low flow rate, associated with an increased load cooking status of the cooking appliance responsively to the received exhaust air temperature signal, the received radiant temperature signal, and the received pressure signal; and

regulating a fire suppression mechanism responsively to at least one of the received exhaust air temperature signal, the received radiant temperature signal, and the received pressure signal,

wherein the fire suppression mechanism is activated in response to the calculation by said control module of a total heat gain above the predetermined magnitude threshold combined with a duration of the heat gain being above a predetermined duration threshold.

2. The method of claim 1, further comprising, using said control module, and responsively to said radiant temperature, exhaust temperature, and a further signal, distinguishing a flare-up from a grill from a fire and regulating a flow rate of the exhaust and/or regulating a fire suppression mechanism responsively to the distinguishing.

3. The method of claim 2, wherein the further signal includes an optical

luminance signal.

4. The method of claim 2 or 3, wherein the distinguishing includes filtering an optical or radiant temperature signal so as to detect a temporal fluctuation and employing machine classification to recognize distinguish at least two cooking states and a fire state.

5. The method of claim 1, wherein said control module includes a processor and a memory with a program stored in the memory adapted for implementing a machine classification algorithm and to control the exhaust flow and fire suppression mechanism responsively to a classifier output thereof.

6. The method of claim 1 or 5, wherein the pressure signal is indicative of a flow rate through the exhaust hood.

7. The method of claim 6, wherein the regulating a flow of exhaust includes regulating a flow of exhaust responsively to said pressure signal.

8. Apparatus configured to perform the method of any preceding claim.

9. Apparatus as claimed in claim 8, including an exhaust hood.

10. Apparatus as claimed in claim 9, including a controller configured to cause the apparatus to perform the method.

11. A combined fire suppression and exhaust flow control system, comprising:

a controller with at least one first sensor, the controller being configured to generate an exhaust flow rate command signal for controlling an exhaust flow rate responsively to a signal from the first sensor;

the controller being further configured to generate a fire suppression command signal for controlling a fire suppression mechanism responsively to a signal from the first sensor,

wherein the fire suppression mechanism is activated in response to the

calculation by said control module of a total heat gain above the predetermined magnitude threshold combined with a duration of the heat gain being above a predetermined duration threshold.

12. The system of claim 11, further comprising an exhaust fan-speed drive connected to the controller so as to receive the exhaust flow rate command signal.

13. The system of claim 11 or 12, further comprising a cooking exhaust hood.

14. The system of claim 11 or 12, wherein the controller includes a digital processor adapted for distinguishing first and second fume load states and for generating a command signal respective to each of the exhaust flow rates.

15. The system of claim 14, wherein the digital processor implements a machine classification algorithm.

16. The system of claim 15, wherein the digital processor implements a machine classification algorithm generated from a supervised learning.

17. The system of claim 15, wherein the digital processor implements an algorithm that is responsive to whether said first signal is temporally fluctuating or not and for regulating the flow of exhaust responsively thereto.

18. The system of any of claims 13 to 17, wherein said first sensor includes a radiant temperature sensor or an air temperature sensor.

19. The system of any of claims 13 to 17, wherein the first sensor includes a camera.

20. The system of claim 19, wherein the camera is able to image in infrared wavelengths.

21. The system of claim 19, wherein the camera is able to image in optical wavelengths.

22. The system of claim 19, wherein the camera is able to image in infrared and optical wavelengths.