

CLAIMS

1. A pest control device comprising:

a capacitive sensor array including a plurality of sensor pads, the capacitive sensor array being configured to generate an electrical output signal indicating the state of each sensor pad, and

an electronic controller electrically connected to the capacitive sensor array, the electronic controller including a processor and a memory including a plurality of instructions, which, when executed by the processor, causes the processor to:

receive the electrical output signals from the capacitive sensor array,

determine a measured capacitance value for each sensor pad based on each electrical output signal,

calculate a baseline for each sensor pad based on the measured capacitance value of the sensor pad,

determine whether a difference between the measured capacitance value of at least one sensor pad and its corresponding baseline exceeds a first predetermined threshold,

update a counter when the first predetermined threshold is exceeded,

record a first event indicative of a presence of a pest when the counter exceeds a predetermined limit, and

record a second event when the electrical output signals indicate a presence of a human.

2. The pest control device of claim 1, wherein the plurality of instructions further cause the processor to calculate each baseline using the following equations:

$$A(new) = A(old) - A(old) * \left(\frac{Kf}{2^{16}}\right) + C_{meas}$$

$$Baseline = A(new) * \left(\frac{Kf}{2^{16}} \right)$$

wherein “Kf” is a parameter stored in a memory device of the electronic controller, “Cmeas” is the measured capacitance value corresponding to the electrical output signal of one sensor pad, and “A(old)” is a variable stored in memory.

3. The pest control device of claim 2, wherein the electronic controller is configured to receive values of Kf from a remote system.

4. The pest control device of any one of the preceding claims, wherein the plurality of instructions further cause the processor to:

determine a sequence of sensor pad contacts based on the electrical output signals,

compare the sequence of sensor pad contacts to a predetermined sequence, and

record the second event when the sequence of sensor pad contacts matches the predetermined sequence.

5. The pest control device of claim 4, further comprising a first visual indicator electrically connected to the electronic controller, wherein the electronic controller is configured to energize the first visual indicator when the sequence of sensor pad contacts matches the predetermined sequence.

6. The pest control device of claim 5, further comprising a second visual indicator electrically connected to the electronic controller, wherein the electronic controller is configured to energize the first visual indicator and the second visual indicator when the electrical output signals indicate the presence of the pest.

7. The pest control device of any one of the preceding claims, wherein the plurality of instructions further cause the processor to: (i) determine whether the difference between the measured capacitance value of at least one sensor pad exceeds a second predetermined threshold, and (ii) update the counter when the difference is less than the second predetermined threshold.

8. The pest control device of any one of the preceding claims, wherein the plurality of instructions further cause the processor to:

determine a sequence of sensor pad contacts based on the electrical output signals when the difference is greater than the second predetermined threshold,

compare the sequence of sensor pad contacts to a predetermined sequence, and

record the second event when the sequence of sensor pad contacts matches the predetermined sequence.

9. The pest control device of any one of the preceding claims, further comprising a position sensor operable to generate an electrical output signal indicative of movement of the pest control device.

10. The pest control device of claim 9, wherein the plurality of instructions cause the processor to:

receive the electrical output signal from the position sensor,

determine, based on the electrical output signals, whether the pest control device has been in a first position for a predetermined period of time,

determine, based on the electrical output signals, a deflection angle of the pest control device when the pest control device has been in the first position for the predetermined period of time,

compare the deflection angle of the pest control device to a predetermined angular threshold, and

generate an output signal when the deflection angle is greater than the predetermined angular threshold.

11. A method of monitoring for pests, the method comprising:
generating an electrical output signal from a capacitive sensor array,
receiving the electrical output signal from the capacitive sensor array,
determining a measured capacitance value based on the electrical output signal,
calculating a baseline for each sensor pad based on the measured capacitance value for the sensor pad,
determining whether a difference between the measured capacitance value of at least one sensor pad and its corresponding baseline exceeds a first predetermined threshold,
updating a counter when the first predetermined threshold is exceeded,
recording a first event indicative of a presence of a pest when the counter exceeds a predetermined limit, and
recording a second event indicative of the presence of the human when the electrical output signals indicate a presence of a human.

12. The method of claim 11, wherein calculating baselines for the sensor pads includes using the following equations:

$$A(new) = A(old) - A(old) * \left(\frac{Kf}{2^{16}}\right) + C_{meas}$$

$$Baseline = A(new) * \left(\frac{Kf}{2^{16}}\right)$$

wherein “Kf” is a parameter stored in a memory device of the electronic controller, “Cmeas” is the measured capacitance value corresponding

to the electrical output signal of one sensor pad, and “A(old)” is a variable stored in memory.

13. The method of claim 11 or 12, further comprising:

determining whether the difference between the measured capacitance value of at least one sensor pad and its corresponding baseline exceeds a second predetermined threshold, and

updating the counter when the difference is less than the second predetermined threshold.

14. The method of claim 13, further comprising:

determining a sequence of sensor pad contacts based on the electrical output signals when the difference is greater than the second predetermined threshold, and

comparing the sequence of sensor pad contacts to a predetermined sequence,

wherein recording the second event includes determining the sequence of sensor pad contacts matches the predetermined sequence.

15. A pest control system, comprising:

a station including a chamber sized to receive a pest, and

a control device coupled to the station, the control device including:

a capacitive sensor array including a plurality of sensor pads, the capacitive sensor array being configured to generate an electrical output signal indicating the state of each sensor pad, and

an electronic controller electrically connected to the capacitive sensor array, the electronic controller being configured to (i) receive the electrical output signals from the capacitive sensor array, (ii) record a first event when at least one of the electrical output signals indicates a presence of a pest, and (iii) record a second event when at

least one of the electrical output signals indicates a presence of a human.

16. The pest control system of claim 15, further comprising bait positioned in the chamber of the station.

17. The pest control system of claim 15 or 16, wherein the control device further includes a position sensor operable to generate an electrical output signal indicative of movement of the station, wherein the electronic controller is configured to record a movement event based on the electrical output signal from the position sensor.

18. The pest control system of any one of claims 15 to 17, wherein the control device further includes a temperature sensor.

19. A pest control system comprising:
a pest trap device,
a pest control device configured to be coupled to the pest trap device, the pest control device comprising:
a capacitive sensor array, and
an electronic controller electrically connected to the capacitive sensor array, the electronic controller being configured to:
receive the electrical output signals from the capacitive sensor array,
determine a measured capacitance value for each sensor pad based on each electrical output signal,
calculate baselines for the sensor pads based on the measured capacitance values,
determine whether a difference between the measured capacitance value of at least one sensor pad and its corresponding baseline exceeds a first predetermined threshold,

update a counter when the first predetermined threshold is exceeded,

record a first event indicative of a presence of a pest when the counter exceeds a predetermined limit, and

record a second event when the electrical output signals indicate a presence of a human.

20. The pest control system of claim 19, wherein the pest control device further comprises:

a capacitive sensor array including a plurality of sensor pads, the capacitive sensor array being configured to generate an electrical output signal indicating the state of each sensor pad, and

the electronic controller is configured to (i) receive the electrical output signals from the capacitive sensor array, and (ii) record the first event when at least one of the electrical output signals indicates a presence of a pest.

21. The pest control system of claim 19 or 20, wherein the pest control device further comprises an outer casing and a support leg pivotally coupled to the outer casing, the support leg including a panel sized to be positioned below the pest trap device.

22. The pest control system of claim 21, wherein:

the pest trap device includes a hinged bar operable to pivot about an axis, and

the pest control device further comprises an outer casing and at least one clip operable to engage the hinged bar such that the pest control device is moved with the hinged bar when the hinged bar is pivoted about the axis.