CLAIMS

1. A self-powered acceleration sensing device comprising:

an acceleration sensing element for converting vibration into electrical energy;

a charge accumulator electrically connected to the acceleration sensing element to accumulate at least a portion of the electrical energy converted from vibration by the acceleration sensing element over a period of time;

a load to be powered by discharge of the portion of the electrical energy from the charge accumulator and being capable of producing an output that is directly observable by an operator; and

a switch for controlling discharge of electrical energy from the charge accumulator to the load,

whereby the switch performs switching between a first condition in which current is substantially prevented from passing through the load, and a second condition in which the portion of the electrical energy is discharged from the accumulator to the load; and

switching is controlled by an amount of energy accumulated in the charge accumulator, wherein the acceleration sensing element is solely responsible for providing the electrical energy to power the self-powered acceleration sensing device including the load observable by the operator without assistance from an external power source.

2. A self-powered acceleration sensing device according to claim 1, wherein the output is a visual or audial output.

3. A self-powered acceleration sensing device according to claims 1-2, wherein the charge accumulator is configured to repetitively accumulate and discharge electrical energy and a time interval between successive discharges depends on at least one aspect of the sensed vibration.

4. A self-powered acceleration sensing device according to claim 3, wherein the at least one aspect of the sensed vibration is indicated to an operator based on the

time interval between successive visual or audial outputs generated by successive discharges of the electrical energy from the charge accumulator.

5. A self-powered acceleration sensing device according to claims 3-4, wherein the at least one aspect of the sensed vibration comprises the magnitude of the acceleration.

6. A self-powered acceleration sensing device according to claim 5, wherein the time interval of successive discharges or the successive visual or audial outputs is inversely correlated to the acceleration magnitude.

7. A self-powered acceleration sensing device according to any preceding claim, wherein the switch comprises at least one transistor configured to turn on to operate the switch to the second condition when a level of electrical energy accumulated in the charge accumulator reaches a pre-determined threshold level.

8. A self-powered acceleration sensing device according to claim 7, wherein the switch comprises a plurality of transistors configured to turn on to operate the switch to the second condition when the level of charge accumulated in the charge accumulator reaches a pre-determined threshold level.

9. A self-powered acceleration sensing device according to claim 8, wherein the plurality of transistors are arranged in a cascading arrangement and are configured to be activated in-turn thereby operating the switch to the second condition when the level of charge accumulated in the charge accumulator reaches a pre-determined threshold level.

10. A self-powered acceleration sensing device according to any one of claims 7-9, wherein at least one transistor has a gate connected to a capacitor, the respective capacitor for extending a duration of an on-state of the respective transistor and thereby extend a duration of the second condition of the switch.

11. A self-powered acceleration sensing device according to any one of claims 7-10, wherein the switch further includes a voltage divider circuit connecting the charge accumulator to the at least one transistor.

12. A self-powered acceleration sensing device according to claim 11, wherein the voltage divider comprises at least two capacitors.

13. A self-powered acceleration sensing device according to any preceding claim, wherein the acceleration sensing element comprises a dielectric sensing element.

14. A self-powered acceleration sensing device according to claim 13, wherein the dielectric sensing element comprises a piezoelectric material.

15. A self-powered acceleration sensing device, according to claim 14, wherein the dielectric sensing element has a cantilever beam structure.

16. A self-powered acceleration sensing device, according to claim 14, wherein the dielectric sensing element has a diaphragm structure.

17. A self-powered acceleration sensing device according to any preceding claim, wherein the charge accumulator comprises a charge-storage capacitor.

18. A self-powered acceleration sensing device, according to claim 17, wherein the capacitor is a ceramic or polymer film capacitor.

19. A self-powered acceleration sensing device according to any preceding claim, further comprising a rectifier between the acceleration sensing element and the charge accumulator.

20. A self-powered acceleration sensing device according to any preceding claim, wherein the load is a light emitting diode (LED) configured to produce light during discharge of the electrical energy from the charge accumulator.

21. A self-powered movement-sensing device according to claim 20, wherein the LED is configured to produce visible pulsed light during discharge of the electrical energy form the charge accumulator.

22. A self-powered acceleration sensing device according to any one of claims 1 to 19, wherein the load is a buzzer configured to produce an audible sound during discharge of the electrical energy from the charge accumulator.

23. A self-powered acceleration sensing device according to any one of claims 1 to 19, wherein the load is a liquid crystal display and the output is displayed on the liquid crystal display.

24. A self-powered acceleration sensing device according to any one of claims 1 to 19, wherein the load is an electrochromic display and the output is displayed on the electrochromic display.

25. A self-powered acceleration sensing device according to any one of claims 1 to 19, wherein the load is a modulated optical retroreflector and the output is displayed on a display of the modulated optical retroreflector.