CLAIMS

1. A monitoring device, comprising:

a sensing module arranged to detect a condition of an object associated with the monitoring device;

a wireless communication module operably connected with the sensing module, the wireless communication module being arranged to communicate the condition detected by the sensing module to an external electronic device; and

an identification module with a unique identifier arranged to be read for identifying the monitoring device,

wherein the monitoring device is arranged to operate in an active mode, a reduced operation mode, and a hibernation mode,

wherein in the active mode, the sensing module continuously detects the condition of the object and the wireless communication module continuously transmits the detected condition to the external electronic device,

wherein in the reduced operation mode, the sensing module continuously detects the condition of the object and the wireless communication module intermittently transmits the detected condition to the external electronic device, and

wherein in the hibernation mode, the sensing module intermittently detects the condition of the object and the wireless communication module is deactivated.

2. The monitoring device of claim 1, wherein the sensing module includes a temperature sensor arranged to detect temperature of the object or of an environment in which the object is arranged.

3. The monitoring device of any one of claims 1-2, wherein the sensing module further includes a humidity sensor arranged to detect humidity of the object or of an environment in which the object is arranged.

4. The monitoring device of any one of claims 1-3, wherein the sensing module further includes a motion sensor arranged to detect a motion of the object.

5. The monitoring device of claim 4, wherein the motion sensor includes an accelerometer, an inertial measurement unit, or a gyro sensor.

6. The monitoring device of any one of claims 1-5, wherein multiple sensors are arranged to simultaneously operate to detect respective conditions of the object.

7. The monitoring device of any one of claims 1-6, wherein the wireless communication module comprises one or more of: a Bluetooth communication module, a Wi-Fi communication module, and a cellular communication module.

8. The monitoring device of claim 7, wherein the cellular communication module comprises an LTE communication module.

9. The monitoring device of any one of claims 1-8, wherein the identification module comprises an NFC module, wherein the NFC module includes a RFID tag.

10. The monitoring device of claim 9, wherein the RFID tag is a dual-band RFID tag operable in a first frequency band and a second frequency band, and wherein the first frequency band is a high-frequency radio band for identification, and the second frequency band is a ultra-high-frequency radio band for locating the monitoring device.

11. The monitoring device of claim 1, further comprises a power source arranged to power the monitoring device, wherein the power source comprises at least one replaceable battery cell.

12. The monitoring device of claim 11, wherein the monitoring device is arranged to selectively operate in the active mode, the reduced operation mode, and the hibernation mode based on an energy level of the power source.

13. The monitoring device of any one of claims 1-12, further comprises a display arranged to display the condition detected by the sensing module.

14. The monitoring device of any one of claims 1-13, further comprises a clock arranged to determine a time stamp associated with the detected condition.

15. The monitoring device of any one of claims 1-14, further comprises an alarm arranged to warn a user when the condition exceeds or below a predetermined range.

16. The monitoring device of any one of claims 1-15, wherein the object is a container arranged to provide a cold environment, and wherein the monitoring device is arranged is suitable for attaching to the container.

17. A monitoring system, comprising:

a monitoring device of any one of claims 1-16; and

an external electronic device arranged to communicate with the monitoring device for receiving one or more of: a condition detected by a sensing module and a unique identifier of the monitoring device.

18. The monitoring system of claim 17, wherein the external electronic device is further arranged to analyze the condition detected by the sensing module to provide an analysis result.

19. The monitoring system of any one of claim 17 or 18, further comprises a display arranged to display the condition detected by the sensing module, and/or a server arranged to store the detected condition.