To extend the life time of the system, the components can be placed in lower-power consumption mode when not actually taking measurements or communicating. Also, tilt sensors can be incorporated to activate all components should sudden movement be detected due the system becoming dislodged.

FIG. **2***b* shows the system **100** in the water **200** during flooding. Numeral **210** indicates a flood crest of sufficient severity to cause the system **100** to be carried down stream.

A satellite or base station **170**, as shown in FIG. **1**, receives the transmitted positional, velocity, and timing information. The base station **170** is coupled to conventional national and local emergency agencies that can forward the warning to the public, for example, by sounding sirens in communities likely to be affected by the flash flood. These agencies can also alert other entities, such as the weather service bureaus, the National Guard, the Red Cross, and so forth.

During the operation, the processor **150** periodically performs self-testing, to ensure that all components are operating properly. The processor can also receive control commands via the transceivers **120**, to provide new operating instructions or parameters, or to make other adjustment to the operation of the sensor without direct physical operator contact.

It should be noted that the sensor according to the invention can also be used in regions that are prone to mud slides, pre-earthquake land movement, lava flows, or in mountain lakes. For example, the system according to the invention can be used in a lake whose outflow could possibly be blocked by a rock slide. Because the system has the capability to detect variations in elevation, it is possible to detect any rapid rising in the water level should a slide occur so that preventive measures can be taken. This is particularly useful for remote mountain lakes, where constant on-site observation would be too costly or impossible.

It should also be noted that the operation is not affected by fog, rain, sunlight, darkness, or foliage growth. And, as an advantage, the system is designed to measure conditions inside a flash flood, unlike traditional rain gauges which are stationary and do not indicate actual flow rates. In a severe flood, the tether will break and the buoyant system will continue to measure and broadcast the rate and location of the flood crest as it travels down stream.

This invention is described using specific terms and examples. It is to be understood that various other adaptations and modifications may be made within the spirit and scope of the invention. Therefore, it is the object of the appended claims to cover all such variations and modifications as come within the true spirit and scope of the invention.

We claim:

1. A land and water flash flood detecting and warning system, comprising:

a buoyant waterproof casing;

a detachable tether externally fixed to the casing having a distal end attached to an anchor to secure the casing in place on land;

accelerometers mounted internally to the casing and configured to measure short-range and short-term positional information of the casing when the casing is in water due to flooding of the land; and

a radio transmitter coupled to the accelerometers to transmit the positional information to land based receiving stations.

2. The system of claim **1** wherein the casing has a smooth elongated ellipsoid shape with a major axis substantially greater than a minor axis.

3. The system of claim **1** wherein the casing is armored.

4. The system of claim **1** further comprising:

short-range and long-range radio transceivers.

5. The system of claim **1** further comprising:

short-range antenna patches embedded in the casing.

6. The system of claim **1** further comprising:

long-range buoyant antennas attached to the casing.

7. The system of claim **1** further comprising:

temperature sensors, acoustic sensors and depth transducers coupled to a microprocessor.

8. The system of claim **1** further comprising:

a flow rate sensor; and

a tether release mechanism coupled to the flow rate sensor.

9. The system of claim **1** wherein the tether is detachable at a predetermined flow rate of the water.

10. The system of claim **1** further comprising:

a GPS receiver to determine long-range and long-term position information of the casing.

11. The system of claim **1** wherein the anchor is a roof bolting rod.

12. The system of claim **1** wherein the anchor is a marine anchor.

13. The system of claim **1** wherein a shape of the casing, a center of mass, and a position of the tether on the casing is adjusted to cause the casing to rapidly flutter laterally when buoyant in rapidly flowing water.

14. A method for detecting and warning of flash-floods, comprising:

attaching a buoyant waterproof casing to land by a detachable tether externally fixed to the casing;

measuring short-range and short-term positional information of the casing using accelerometers mounted internally to the casing when the casing is in water due to flooding of the land; and

transmitting the short-range and short-term positional information of the casing to land based receiving stations.

15. The method of claim **14** further comprising:

detaching the casing at a predetermined flow rate of the water.

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