CLAIMS

1. A ladder comprising:

a front rail unit having a plurality of steps and a rear rail unit;

a right outrigger leg unit coupled to a right side of the ladder, wherein the right outrigger leg unit is configured to provide side support on the right side of the ladder;

a left outrigger leg unit coupled to a left side of the ladder, wherein the left outrigger leg unit is configured to provide side support on the left side of the ladder; and

an electronic system which enhances safe operation of the ladder, the electronic system comprises:

a sensor network having a plurality of sensors for sensing force asserted on the outrigger leg units, an angle of inclination and acceleration of the ladder; and

a processing unit coupled to the sensor network, the processing unit processes information from the sensor network and generates a warning alert of potential unsafe use of the ladder;

a right swivel joint for coupling the right outrigger leg unit to the right side of the ladder, wherein the right swivel joint comprises right force sensors of the sensor network to measure force asserted on the right outrigger leg unit;

a left swivel joint for coupling the left outrigger leg unit to the left side of the ladder, wherein the left swivel joint comprises left force sensors of the sensor network to measure force asserted on the left outrigger leg unit.

2. The ladder of claim 1 wherein the swivel joints comprise bearing housings to accommodate and freely rotate bearing rods of the outrigger leg units about a vertical axis

which is perpendicular to a ground.

3. The ladder of claim 1 wherein the ladder comprises an A-frame ladder, wherein the A-frame ladder includes an A-limiting panel which serves to inform a user of a maximum height of ladder defined by a step below the A-limiting panel.

4. The ladder of claim 1 wherein the ladder comprises an A-frame platform ladder having an A-frame platform, wherein the A-frame platform ladder includes an electronic housing module which is mounted on a bottom side of the A-frame platform; and

the sensor network of the electronic system further comprises load sensors housed in the electronic housing module, the load sensors are configured to measure a load asserted on the platform of the A-frame platform ladder.

5. The ladder of claim 1 wherein the ladder comprises an A-frame ladder.

6. The ladder of claim 1 wherein the ladder comprises an A-frame platform ladder.

7. The ladder of claim 1 wherein:

the right outrigger leg unit is disposed adjacent and parallel to the right side of the ladder in the folded position;

in the unfolded position, the right outrigger leg unit is disposed on the right side of the ladder to provide side support on the right side of the ladder when unfolded;

the left outrigger leg unit is disposed adjacent and parallel to the left side of the ladder in the folded position; and

in the unfolded position, the left outrigger leg unit is disposed on the left side of the ladder to provide side support on the left side of the ladder when unfolded.

8. The ladder of claim 1 wherein:

the right swivel joint further comprises right bearings to rotate the right bearing rod, wherein the right bearing rod rotates about a right swivel axis from which a right swivel angle is measured; and

the left swivel joint further comprises left bearings to rotate the left bearing rod, wherein the left bearing rod rotates about a left swivel axis from which a left swivel angle is measured.

9. The ladder of claim 1 comprises:

the right swivel joint for coupling the right outrigger leg unit to the right side of the front rail unit; and

the left swivel joint for coupling the left outrigger leg unit to the left side of the front rail unit.

10. The ladder of claim 8 wherein:

the right swivel joint further comprises a right joint assembly, the right joint assembly couples the right bearing rod to the right outrigger leg unit; and

the left swivel joint further comprises a left joint assembly, the left joint assembly couples the left bearing rod to the left outrigger leg unit.

11. The ladder of claim 10 wherein the joint assembly couples the bearing rod at a dedicated outrigger swing angle.

12. The ladder of claim 11 wherein the dedicated outrigger swing angle is selected to provide lateral stability in the unfolded position.

13. The ladder of claim 1 wherein:

the right outrigger leg unit includes a right outrigger leg having an adjustable right foot for adjusting a length of the right outrigger leg; and

the left outrigger leg unit includes a left outrigger leg having an adjustable left foot for adjusting a length of the left outrigger leg.

14. The ladder of claim 1 comprises:

an electronic housing module which houses the processing unit and an inertial measurement unit (IMU), the IMU measures the angle of inclination and acceleration of the ladder in 3 axes.