CLAIMS

1. A lifting device comprising:

a frame couplable to a support;

a mass moveably coupled to the frame,

a plurality of wire rope systems coupled to the frame, the plurality of wire rope systems being configured to hold a load relative to the frame, wherein each of the plurality of wire rope systems comprises a wire rope with an independently adjustable operating length; and

a plurality of sensors coupled to the frame, the plurality of sensors being configured to sense at least one parameter of the load,

the lifting device being configured to move the mass relative to the frame to displace a center of gravity of the frame to tilt the frame, and independently adjust the operating length of each of the wire ropes, to laterally displace the load relative to the support.

2. The lifting device as recited in claim 1, wherein the respective operating length of each wire rope is independently adjustable to level the load relative to the support, responsive to inputs from the plurality of sensors.

3. The lifting device as recited in any one of the above claims, wherein each of the plurality of wire rope systems further comprises an electric winch coupled to the frame, each of the electric winch being configured to adjust the operating length of respective ones of the wire rope.

4. The lifting device as recited in any one of the above claims, wherein the plurality of sensors comprises a plurality of load sensors, each of the plurality of load sensors being coupled to respective ones of the wire rope and being configured to measure a tension in respective ones of the wire ropes.

5. The lifting device as recited in any one of claims 3 and 4, wherein at least one of the electric winches is coupled to each of a plurality of corners of the frame.

6. The lifting device as recited in any one of the above claims, further comprising an inclinometer removably coupleable to the load, the inclinometer being configured to determine an inclination of the load relative to the support.

7. The lifting device as recited in claim 6, wherein the inclination of the load comprises a first inclination angle along a first axis; and a second inclination angle along a second axis, wherein the first axis is orthogonal to the second axis.

8. The lifting device as recited in claim 1, wherein the mass is movable relative to the frame along a first direction and a second direction, wherein the first direction is orthogonal to the second direction.

9. The lifting device as recited in claim 8, further comprising a first linear actuator coupled to the frame, the first linear actuator being configured to move the mass along the first direction; and a second linear actuator coupled to the frame, the second linear actuator being configured to move the mass along the second direction.

10. The lifting device as recited in any one of the above claims, further comprising at least one flywheel gyroscope system coupled to the frame, each of the at least one flywheel gyroscope system being configured to provide a controllable torque to the frame.

11. The lifting device as recited in claim 10, wherein each of the at least one flywheel gyroscope system comprises:

a gimbal axle moveable relative to the frame; and

a flywheel rotatably coupled to the gimbal axle, wherein each of a rotational speed of the flywheel and an orientation of the gimbal axle is independently controllable to vary the torque on the frame.

12. The lifting device as recited in any one of the above claims, wherein the plurality of sensors comprises: a first gyroscopic sensor coupled to the frame, the first gyroscopic sensor being configured to determine an orientation of the frame; and a second gyroscopic sensor coupled to the load, the second gyroscopic sensor being configured to determine an orientation of the load.

13. The lifting device as recited in any one of the above claims, wherein the plurality of sensors comprises: at least one camera coupled to the frame, the at least one camera being orientated towards the load to provide an image of the load.

14. The lifting device as recited in any one of the above claims, wherein the load is a modular construction unit.

15. A lifting system comprising:

the lifting device as recited in any one of the above claims; and

a controller in signal communication with the lifting device, the controller being configured to control the lifting device to independently vary each of three rotational degrees of freedom of the load.

16. The lifting system as recited in claim 15, wherein the controller is in a wireless signal communication with the lifting device.

17. The lifting system as recited in any one of claims 15 or 16, further comprising a user controller disposed remotely from and in wireless signal communication with the controller, the user controller being configured to transmit a control command from a user to the controller.

18. A method of lifting a load, the method comprising:

holding a load relative to a frame with a plurality of wire rope systems, the frame coupled to a support, wherein each of the plurality of wire rope systems comprises a wire rope with an independently adjustable operating length;

receiving inputs from a plurality of sensors coupled to the frame, the plurality of sensors being configured to sense at least one parameter of the load; and

based on the inputs from the plurality of sensors, moving a mass relative to the frame to displace a center of gravity of the frame to tilt the frame; and independently adjusting the operating length of each of the wire rope to laterally displace the load relative to the support.

19. The method as recited in claim 18, further comprising: levelling the load by independently adjusting the respective operating length of each of the wire rope.

20. The method as recited in any one of claims 18 to 19, further comprising: providing a controllable torque on the frame by independently controlling: a rotational speed of a flywheel of a flywheel gyroscope system; and an orientation of a gimbal axle of the flywheel gyroscope system relative to the frame.