CLAIMS

1. An asset monitoring system for real-time monitoring of assets in a warehouse, the system comprising:

    at least one camera provided in the warehouse to obtain images of assets in the warehouse;

    an image processing software module provided in connection with the at least one camera and configured to automatically assign a unique identification to every asset imaged for a first time by the at least one camera and subsequently continuously detect, recognize and track assets assigned with unique identification in the warehouse from the images obtained by the at least one camera;

    a location determination software module configured to generate, from the images obtained of the assets, spatial coordinates of the assets corresponding to physical locations of the assets in the warehouse, the spatial coordinates comprising coordinates in a 3D coordinate system that takes reference from actual storage space in the warehouse; and

    a digital inventory stored in a database, the digital inventory comprising the generated spatial coordinates and status information of the assets, the digital inventory configured to be accessible via at least one computing device to allow viewing and updating of the status information of the assets.

2. The system of claim 1, further comprising a monitoring software module configured to continuously monitor data in the digital inventory and continuously monitor detection, recognition and tracking of the assets by the imaging processing software module in order to determine occurrence of events including:

    (i) movement of an asset within the warehouse;

    (ii) removal of an asset from the warehouse;

    (iii) item movement, item removal and/or asset separation for an asset comprising multiple items; and

    (iv) tampering with an asset.

3. The system of claim 2, wherein the monitoring software module is further configured to perform image comparison to detect any change in geometry of each asset in the obtained images and conclude that item removal or asset separation has occurred when a change in geometry has been detected for an asset at different times.

4. The system of claim 2 or claim 3, wherein the monitoring software module is further configured to check status information of an asset for which any one of events (i) to (iv) has occurred to determine if authorization has been given for the event to occur and to trigger an alert if it is determined that any one of events (i) to (iv) has occurred without authorization having been given.

5. The system of claim 4, further comprising an alarm configured to be triggered when the monitoring software module determines that any one of events (i) to (iv) has occurred for any asset without authorization having been given

6. The system of any one of the preceding claims, further comprising a modelling software module configured to generate, for each asset, a digital asset comprising a 3D digital model of the asset, and to show all generated digital assets in a 3D digital space corresponding to the warehouse on a display screen of at least one computing device.

7. The system of claim 6, wherein a 3D geometry and virtual location of each digital asset in the 3D digital space corresponds to 3D geometry and actual physical location of its corresponding asset in the warehouse.

8. The system of claim 7, wherein each digital asset shown on the display screen is configured to be selectable using an input device of the at least one computing device for at least one of: viewing status information of the selected digital asset and unencumbered viewing of the selected digital asset in the 3D digital space.

9. The system of claim 8, wherein each digital asset shown on the display screen is further configured to allow only an authorized user of the at least one computing device to update status information of the selected digital asset.

10. The system of any one of the preceding claims, further comprising an inventory updating software module provided in association with the digital inventory and configured to allow status information of assets in the warehouse to be input in the digital inventory by only an authorized user via a computing device.

11. The system of any one of the preceding claims, wherein the at least one camera comprises multiple cameras provided at different locations in the warehouse to obtain images of the assets from different viewing angles.

12. The system of claim 11, wherein at least one of the multiple cameras comprises a mobile camera.

13. A method of real-time monitoring assets in a warehouse, the method comprising:
    (a) obtaining images of assets in the warehouse via at least one camera provided in the warehouse;
    (b) automatically assigning a unique identification to every asset imaged for a first time by the at least one camera via an image processing software module provided in connection with the at least one camera;
    (c) the image processing software module continuously detecting, recognizing and tracking assets assigned with unique identification in the warehouse from the images obtained by the at least one camera;
    (d) generating, from the images obtained of the assets, spatial coordinates of the assets corresponding to physical locations of the assets in the warehouse via a location determination software module, wherein the spatial coordinates comprise coordinates in a 3D coordinate system that takes reference from the actual storage space in the warehouse;
    (e) storing a digital inventory comprising the generated spatial coordinates and status information of the assets in a database; and
    (f) viewing and updating the status information of the assets via at least one computing device provided with access to the digital inventory.

14. The method of claim 13, further comprising:
    (g) a monitoring software module continuously monitoring data in the digital inventory and continuously monitoring detection, recognition and tracking of the assets by the imaging processing software module; and
    (h) the monitoring software module determining occurrence of events including:
        (i) movement of an asset within the warehouse;
        (ii) removal of an asset from the warehouse;
        (iii) item movement, item removal and/or asset separation for an asset comprising multiple items; and
        (iv) tampering with an asset.

15. The method of claim 14, further comprising:

(i) the monitoring software module performing image comparison to detect any change in geometry of each asset in the obtained images and concluding that item removal or asset separation has occurred when a change in geometry has been detected for an asset at different times.

16. The method of claim 14 or claim 15, further comprising:

(j) wherein the monitoring software module checking status information of an asset for which any one of events (i) to (iv) has occurred to determine if authorization has been given for the event to occur and triggering an alert if it is determined that any one of events (i) to (iv) has occurred without authorization having been given.

17. The method of claim 16, further comprising:

(k) an alarm triggering when the monitoring software module determines that any one of events (i) to (iv) has occurred for any asset without authorization having been given

18. The method of any one of claims 13 to 17, further comprising:

(l) a modelling software module generating, for each asset, a digital asset comprising a 3D digital model of the asset, and showing all generated digital assets in a 3D digital space corresponding to the warehouse on a display screen of at least one computing device.

19. The method of claim 18, wherein a 3D geometry and virtual location of each digital asset in the 3D digital space corresponds to 3D geometry and actual physical location of its corresponding asset in the warehouse.

20. The method of claim 19, further comprising:

(m) selecting a digital asset shown on the display screen using an input device of the at least one computing device for at least one of: viewing status information of the selected digital asset and unencumbered viewing of the selected digital asset in the 3D digital space.

21. The method of claim 20, further comprising:

(n) only an authorized user of the at least one computing device updating status information of the selected digital asset.

22. The method of any one of the claims 13 to 21, further comprising:

(o) only an authorized user inputting status information of assets in the warehouse via a

computing device provided with an inventory updating software module provided in association with the digital inventory.