Claims

1. A method for navigating a mobile platform using an imaging device on the platform, from a point of origin towards a target located in a scene, and without requiring a Global Navigation Satellite system (GNSS), the method comprising:

   a) acquiring , by the imaging device, an image of the scene comprising the target;

   b) determining, based on analysis of the image, a direction vector pointing from the mobile platform to the target;

   c) advancing the mobile platform in accordance with the direction vector to a new position;

   d) generating, by a distance sensing device, an output as a result of attempting to determine, with the distance sensing device, a distance between the mobile platform and the target;

   e) repeating a) to d) to advance the mobile platform towards the target, comprising generating a plurality of direction vectors until the output produced by the distance sensing device is descriptive of a distance which meets a low-distance criterion at a current position;

   f) retroactively updating, based on the distance meeting the low-distance criterion, the plurality of direction vectors to obtain a plurality of displacement vectors having a magnitude and which are descriptive of a path that was traversed by the mobile platform from the point of origin to the current mobile platform position in accordance with the direction vectors; and

   g) determining, based on the plurality of displacement vectors, an updated estimate of a current mobile platform position relative to the target.

2. The method of claim 1, comprising:

   determining, based on at least two displacement vectors, a model displacement vector descriptive of a model position of the mobile platform relative to the target for advancing the mobile platform, in accordance with the model displacement vector, towards the target.

3. The method of claim 2, wherein the model displacement vector represents a weighted average or weighted mean or median of at least two reference vectors, which are optionally component-wise weighted average or weighted mean or median.

4. The method of any one or more of the preceding claims, wherein the low-distance threshold criterion defines a threshold of equal or lower than 10 meters.

5. A system for navigating a mobile platform using imaging from a point of origin towards a target located in a scene, and without requiring a Global Navigation Satellite system (GNSS), the system comprising:

   a mobile platform comprising an imaging device and a distance sensing device;

   one or more processors; and

   one or more memories storing software code portions executable by the one or more processors to cause the system to perform the following steps:

   a) acquiring, by the imaging device, an image of a scene comprising a target;

   b) determining, based on analysis of the image, a direction vector pointing from the mobile platform to the target;

   c) advancing the mobile platform in accordance with the direction vector to a new position;

   d) generating, by a distance sensing device, an output as a result of attempting to determine, with the distance sensing device, a distance between the mobile platform and the target;

   e) repeating a) to d) to advance the mobile platform towards the target, comprising generating a plurality of direction vectors until the output produced by the distance sensing device is descriptive of a distance which meets a low-distance criterion at a current position having an associated current position estimate;

   f) retroactively updating, based on the distance meeting the low-distance criterion, the plurality of direction vectors to obtain a plurality of displacement vectors having a magnitude, and which are descriptive of a path that was traversed by the mobile

platform from the point of origin to the current mobile platform position in accordance with the direction vectors; and

g) determining, based on the plurality of displacement vectors, an updated estimate of a current mobile platform position relative to the target.

6. The system of claim 5, wherein the platform is navigated towards the target, based on the at least one of the plurality of displacement vectors.

7. The system of claim 5 or claim 6, wherein the one or more memories storing software code portions executable by the one or more processors are configured to cause the system to perform the following steps

   determining, based on at least two displacement vectors, a model displacement vector descriptive of a model position of the mobile platform relative to the target for advancing the mobile platform, in accordance with the model displacement vector, towards the target.

8. The system of claim7, wherein the at least two displacement vectors define a centroid; and

   wherein the model displacement vector has a vector start point coinciding with the centroid and a vector end point coinciding with the target.

9. The system of any one or more of the claims 7 or 8, wherein the model displacement vector represents an average or mean or median value of at least two reference vectors, optionally represented by a component-wise average or mean or median value.

10. The system of any one or more of the claims 5 to 9, wherein the target is identified within the image based on a machine learning model.

11. The system of any one or more of the claims 5 to 10, wherein the advancing of the mobile platform in accordance with the direction vectors is performed using one of the following:

Simultaneous Localization and Mapping (SLAM) technique; triangulation-based navigation techniques; star-based navigation techniques; or any combination of the aforesaid.

12. The system of any one or more of the claims 5 to 11, wherein the at least one distance sensing devices include one of the following:

    a stereoscopic camera, an ultrasonic sensor, an infrared sensor, an ultrawideband (UWB) sensor; a laser-based sensor; a RADAR, a LIDAR, or any combination of the aforesaid.

13. The system of any one or more of the claims 5 to 12, wherein the target includes an opening in a building wall.

14. A mobile platform configured to navigate from a point of origin towards a target located in a scene, without requiring a Global Navigation Satellite system (GNSS), the mobile platform comprising:

    at least one imaging device configured to acquire at least one image of the scene comprising the target;

    at least one distance sensing device configured to produce an output descriptive of a distance between the mobile platform and the target;

    at least one avionics system comprising a navigation control engine for navigating the mobile platform towards the target; in accordance with the following steps:

    a) acquiring, by the at least one imaging device, at least one image of a scene comprising a target;

    b) determining, based on analysis of the at least one image, a direction vector pointing from the mobile platform to the target;

    c) advancing the mobile platform in accordance with the direction vector to a new position;

    d) generating, by the at least one distance sensing device, an output as a result of attempting to determine, with the distance sensing device, a distance between the mobile platform and the target;

e) repeating a) to d) to advance the mobile platform towards the target, comprising: generating a plurality of direction vectors until the output produced by the distance sensing device is descriptive of a distance which meets a low-distance criterion at a current position, having an associated current position estimate;

f) retroactively updating, based on the distance meeting the low-distance criterion, at least two of the plurality of direction vectors to obtain, correspondingly, at least two displacement vectors having a magnitude and which are descriptive of a path that was traversed by the mobile platform from the point of origin to the current mobile platform position in accordance with the direction vectors; and

g) determining, based on the at least two displacement vectors, an updated estimate of a current mobile platform position relative to the target.

15. The mobile platform of claim 14, wherein the steps further comprise:

determining, based on at least two displacement vectors, a model displacement vector descriptive of a model position of the mobile platform relative to the target for advancing the mobile platform, in accordance with the model displacement vector, towards the target.

16. The mobile platform of claim 14 or claim 15, wherein the at least two displacement vectors define a centroid; and

wherein the model displacement vector has a vector start point coinciding with the centroid and a vector end point coinciding with the target.

17. The mobile platform of any one or more of the claims 14 to 16, wherein the model displacement vector represents a weighted average or weighted mean or median of at least two reference vectors, which are optionally component-wise weighted average or weighted mean or median.

18. The mobile platform of any one or more of the claims 14 to 17, wherein the advancing of the mobile platform in accordance with the direction vectors is performed using one of the following:

Simultaneous Localization and Mapping (SLAM) technique; triangulation-based navigation techniques; star-based navigation techniques; or any combination of the aforesaid.

19. A mobile platform configured to navigate from a point of origin towards a target located in a scene, without requiring a Global Navigation Satellite system (GNSS), the mobile platform comprising:

at least one imaging device configured to acquire at least one image of the scene comprising the target;

at least one distance sensing device configured to produce an output descriptive of a distance between the mobile platform and the target;

at least one avionics system comprising a navigation control engine for navigating the mobile platform towards the target; in accordance with the following steps:

a) acquiring, by the at least one imaging device, at least one image of a scene comprising a target;

b) determining, based on analysis of the at least one image, a direction vector pointing from the mobile platform to the target;

c) advancing the mobile platform in accordance with the direction vector to a new position;

d) generating, by the at least one distance sensing device, an output as a result of attempting to determine, with the distance sensing device, a distance between the mobile platform and the target;

e) repeating a) to d) to advance the mobile platform towards the target, comprising: generating a plurality of direction vectors until the output produced by the distance sensing device is descriptive of a distance which meets a low-distance criterion at a current position having an associated current position estimate;

f) retroactively updating, based on the distance meeting the low-distance criterion, at least two of the plurality of direction vectors to obtain, correspondingly, at least two displacement vectors having a magnitude and which are descriptive of a path that was traversed by the mobile platform from the point of origin to the current mobile platform position in accordance with the direction vectors; and

g) navigating, based on the at least two displacement vectors, the mobile platform to the target.

20. The mobile platform of claim 19, wherein the steps further comprise:

determining, based on at least two displacement vectors, a model displacement vector descriptive of a model position of the mobile platform relative to the target for navigating the mobile platform, in accordance with the model displacement vector, towards the target.