

CLAIMS:

1. A method comprising, by a processor and memory circuitry (PMC), for an aerial vehicle comprising a payload operative to perform an interaction with a target:

for each target of a plurality of targets, determining an interaction area based on a position of the target,

wherein, for each position of the aerial vehicle located in the interaction area of the target, the interaction between the payload and the target is enabled according to an operability criterion,

dividing the plurality of targets into a plurality of clusters, wherein at least one cluster comprises at least two targets of the plurality of targets, wherein said dividing is based on a distribution of distance between the targets,

determining an order between the plurality of clusters,

generating a series of connections, wherein each connection comprises at least one waypoint located in an interaction area of a target of the plurality of targets and at least one waypoint located in an interaction area of another different target of the plurality of targets, wherein each interaction area comprises a waypoint of at least one connection of the series of connections, and

obtaining a flight path for the aerial vehicle using the series of connections, wherein said flight path follows said order between the plurality of clusters.

2. A system comprising a processor and memory circuitry (PMC), configured to, for an aerial vehicle comprising a payload operative to perform an interaction with a target:

for each target of a plurality of targets, determine an interaction area based on a position of the target,

wherein, for each position of the aerial vehicle located in the interaction area of the target, the interaction between the payload and the target is enabled according to an operability criterion,

divide the plurality of targets into a plurality of clusters, wherein at least one cluster comprises at least two targets of the plurality of targets, wherein said dividing is based on a distribution of distance between the targets,

determine an order between the plurality of clusters,

generate a series of connections, wherein each connection comprises at least one waypoint located in an interaction area of a target of the plurality of targets and at least one waypoint located in an interaction area of another different target of the plurality of targets, wherein each interaction area comprises a waypoint of at least one connection of the series of connections, and

obtain a flight path for the aerial vehicle using the series of connections, wherein said flight path follows said order between the plurality of clusters.

3. The system of claim 2, configured to, during a flight of the aerial vehicle:

(1) for a period of time T_i of the flight of the aerial vehicle:

for each target of a plurality of targets, obtain an interaction area based on a position of the target at the period of time T_i ,

wherein, for each position of the aerial vehicle located in the interaction area of the target, the interaction between the payload and the target is enabled according to an operability criterion,

wherein at least one target of the plurality of targets is a moving target,

generate a series of connections, wherein each connection comprises at least one waypoint located in an interaction area of a target of the plurality of targets and at least one waypoint located in an interaction area of another different target of the plurality of targets, wherein each interaction area comprises a waypoint of at least one connection of the series of connections,

obtain a flight path FP_i for the aerial vehicle using the series of connections,

(2) repeating (1) at least once for a period of time T_{i+1} different from T_i , wherein the moving target has a position at time T_{i+1} different from time T_i , to generate an updated flight path FP_{i+1} for the aerial vehicle.

4. The system of claim 2 or of claim 3, wherein (i), (ii), (iii) or (iv) is met:

(i) the payload comprises an acquisition device and the interaction with the target comprises an acquisition of the target by the acquisition device;

(ii) the payload comprises an acquisition device and the interaction with the target comprises an acquisition of the target by the acquisition device, wherein the interaction area of each target is determined based on a maximal zoom-in capability of the acquisition device.

(iii) for each position of the aerial vehicle located in the interaction area of said target, the interaction between the payload and said target is enabled according to the operability criterion, and

(iv) for each position of the aerial vehicle located outside the given interaction area, the interaction between the payload and the given target is not enabled according to the operability criterion.

5. The system of any one of claims 2 to 4, wherein generating the series of connections comprises determining a connection between a waypoint of a given connection of the series of connections and an interaction area of a next target, said determining comprising selecting the connection among one of:

(i) a connection which comprises the waypoint and is orthogonal to a tangent to a boundary of the interaction area of the next target;

(ii) a connection which comprises the waypoint and is tangent to the boundary of the interaction area of the next target;

(iii) a connection which intersects an interior area of the interaction area of the next target.

6. The system of any one of claims 2 to 5, wherein, for at least one given target of the plurality of targets associated with a given interaction area, a given connection of the series of connections comprises a waypoint located at a boundary of said given interaction area, said waypoint having a position different from a position of the given target.

7. The system of any one of claims 2 to 6, wherein generating the series of connections comprises generating a connection from a starting waypoint, said generating comprising:

determining a first target among the plurality of targets, for which a first candidate connection C_1 meets an optimization criterion, wherein the first candidate connection C_1 comprises a first waypoint $W_{1,1}$ corresponding to the starting waypoint, and a second waypoint $C_{1,2}$ located at a boundary of an interaction area of the first target, wherein the first candidate connection C_1 is orthogonal to said boundary.

8. The system of claim 7, wherein the optimization criterion takes into account at least one of:

(i) a length of the first candidate connection C_1 ; and

(ii) a level of priority of the first target.

9. The system of claim 7 or of claim 8, configured to:

determine a second target among the plurality of targets, for which a second candidate connection C_2 comprising the second waypoint $W_{1,2}$ and a third waypoint $W_{2,1}$ located at a boundary of an interaction area of the second target, meets an optimization criterion, wherein the second candidate connection C_2 is orthogonal to said boundary; after identification of the first target and the second target:

perform a comparison between:

a first series of connections comprising the first candidate connection C_1 and the second candidate connection C_2 , and

a second series of connections comprising a first candidate connection C'_1 comprising the first waypoint $C_{1,1}$ and a second waypoint $W'_{1,2}$ located at a boundary of the interaction area of the first target, wherein the first candidate connection C'_1 is tangent to the boundary of the interaction area of the first target at said second waypoint $W'_{1,2}$,

generate the series of connections based on the comparison.

10. The system of any one of claims 2 to 9, wherein generating the series of connections comprises:

determining an order among targets of the plurality of targets for generating the series of connections, wherein a second target is consecutive to a first target according to said order, and

determining a candidate connection which intersects at least one of:

an interior area of an interaction area of the first target, and

an interior area of an interaction area of the second target,

using said candidate connection for generating the series of connections.

11. The system of any one of claims 2 to 10, configured to:

obtain at least one forbidden area, and

generate the series of connections, wherein each connection of the series of connections does not comprise any waypoint located in the forbidden area.

12. The system of any one of claims 2 to 11, wherein determining the order between the plurality of clusters uses at least one of:

(i) a distance between a center of mass of each cluster and an initial position from which the flight path is to be generated;

(ii) a number of targets of each cluster;

(iii) data informative of a level of priority of the one or more targets of each cluster.

13. The system of any one of claims 2 to 12, configured to, for at least one given cluster of the plurality of clusters:

determine an order between targets of the given cluster according to a decreasing distance with respect to a next cluster being after said given cluster,

generate the flight path, wherein said flight path follows said order between the targets of the given cluster.

14. The system of any one of claims 2 to 13, configured to:

identify at least one given connection which has a length which differs from a length of other connections of the series of connections according to a criterion,

generate an updated series of connections, which:

(i) does not comprise said given connection, and

(ii) has a length which is smaller than a length of the series of connections.

15. The system of any one of claims 2 to 14, configured to, for at least one target of the plurality of targets:

obtain data informative of a position of the target and data informative of a dimension of the target,

use the data informative of a position of the target and the data informative of a dimension of the target to determine the interaction area of the target.

16. The system of any one of claims 2 to 15, wherein the series of connections is generated progressively, wherein generation of said series of connections comprises determining a connection between a current waypoint and an interaction area of a next target, wherein the next area is determined based on at least one of:

(i) a distance between the current waypoint and the interaction area of the next target;
and

(ii) a level of priority of the next target indicative of a priority to perform an interaction between the payload and the next target.

17. The system of any one of claims 2 to 16, wherein (i) or (ii) is met:

(i) the system is configured to, for a given period of time T_1 :

determine a given moving target among the plurality of targets for which a distance between a position of the aerial vehicle at time T_1 and a position of the given moving target at time T_1 or an interaction area of the given moving target at time T_1 meets a criterion,

estimate a time ΔT_{target} for the aerial vehicle to reach the given moving target or the interaction area of the given moving target,

predict position of moving targets of the plurality of targets at time $T_1 + \Delta T_{\text{target}}$,

generate a connection between the position of the aerial vehicle at time T_1 and an interaction area of a given target of the plurality of targets, wherein the interaction area is estimated for a position of the given target at time $T_1 + \Delta T_{\text{target}}$.

(ii) the system is configured to, for a given period of time T_1 :

determine a given moving target among the plurality of targets for which a distance between a position of the aerial vehicle at time T_1 and a position of the given moving target at time T_1 or an interaction area of the given moving target at time T_1 meets a criterion,

estimate a time ΔT_{target} for the aerial vehicle to reach the given moving target or the interaction area of the given moving target,

predict position of moving targets of the plurality of targets at time $T_1 + \Delta T_{\text{target}}$,

generate a connection between the position of the aerial vehicle at time T_1 and an interaction area of a given target of the plurality of targets, wherein the interaction area is estimated for a position of the given target at time $T_1 + \Delta T_{\text{target}}$,

wherein a distance between a position of the aerial vehicle at time T_1 and a position of the given target at time $T_1 + \Delta T_{\text{target}}$ or an interaction area of the given target at time $T_1 + \Delta T_{\text{target}}$ meets the criterion.

18. The system of any one of claims 2 to 17, configured to:

for the given period of time T_1 :

(10) determine a given moving target among the plurality of targets for which a distance between a starting waypoint W_i and a position of the given moving target at time T_i or an

interaction area of the given moving target at time T_i meets a criterion, wherein, at a first iteration of (10), T_i is equal to T_1 and W_i corresponds to a position of the aerial vehicle at time T_1 ,

(11) estimating a future time T_{i+1} at which the aerial vehicle, starting from W_i , will reach the given moving target or the interaction area of the given moving target,

(12) predicting position of one or more moving targets of the plurality of targets at time T_i ,

(13) generating a connection between W_i and an interaction area of a given target of the plurality of targets, wherein the interaction area is estimated for a position of the given target at time T_{i+1} , wherein a distance between W_i and a position of the given target at time T_{i+1} or an interaction area of the given target at time T_{i+1} meets the criterion,

(14) repeating (10) to (13) at least once, wherein for said repeating W_i is set equal to an extremity of the connection determined at (13) and T_i is set equal to T_{i+1} .

19. An aerial vehicle comprising:

a payload operative to perform an interaction with a target,

a processor and memory circuitry (PMC), configured to:

for each target of a plurality of targets, determine an interaction area based on a position of the target,

wherein, for each position of the aerial vehicle located in the interaction area of the target, the interaction between the payload and the target is enabled according to an operability criterion,

divide the plurality of targets into a plurality of clusters, wherein at least one cluster comprises at least two targets of the plurality of targets, wherein said dividing is based on a distribution of distance between the targets,

determine an order between the plurality of clusters,

generate a series of connections, wherein each connection comprises at least one waypoint located in an interaction area of a target of the plurality of targets and at least one waypoint located in an interaction area of another different target of the plurality of targets, wherein each interaction area comprises a waypoint of at least one connection of the series of connections, and

obtain a flight path for the aerial vehicle using the series of connections, said flight path follows said order between the plurality of clusters.

20. A non-transitory storage device readable by processor and memory circuitry (PMC), tangibly embodying a program of instructions executable by the PMC to perform, for an aerial vehicle comprising a payload operative to perform an interaction with a target:

for each target of a plurality of targets, determining an interaction area based on a position of the target,

wherein, for each position of the aerial vehicle located in the interaction area of the target, the interaction between the payload and the target is enabled according to an operability criterion,

dividing the plurality of targets into a plurality of clusters, wherein at least one cluster comprises at least two targets of the plurality of targets, wherein said dividing is based on a distribution of distance between the targets,

determining an order between the plurality of clusters,

wherein at least one target of the plurality of targets is a moving target,

generating a series of connections, wherein each connection comprises at least one waypoint located in an interaction area of a target of the plurality of targets and at least one waypoint located in an interaction area of another different target of the plurality of targets, wherein each interaction area comprises a waypoint of at least one connection of the series of connections, and

obtaining a flight path for the aerial vehicle using the series of connections, wherein said flight path follows said order between the plurality of clusters.