CLAIMS:

1. A method of autonomous control over an aircraft while traversing an area, the method comprising, with the help of a processing circuity comprising at least one computer processor, performing at least the following operations:

while the aircraft is flying in midair, in response to ~~data indicative of~~ a need to autonomously ~~navigate the aircraft, calculating~~calculate a flight path from a current position of the aircraft to a target position of the aircraft located near a landing site, the calculation comprising:

determining an initial flight path leading from a current position to the target position;

determining vertical maneuverability of the aircraft;

processing of the initial flight path, the processing comprising:

A. determining whether there is one or more restricted areas located along the flight path;

for each restricted area:

calculating a predicted altitude range of the aircraft when traversing the restricted area;

determining whether there is a conflict between an altitude restriction characterizing the restricted area and the predicted altitude range;

and should such conflict exist, ,

determining one or more alternative sections circumventing the restricted area; ~~each~~and generating one or more candidate flight paths, each comprising an alternative section, together with one or more previous sections leading to the alternative section~~, represent a candidate flight path; ~~;

wherein in case the vertical maneuverability allows the aircraft to vertically circumvent the restricted area, the one or more

alternative sections comprises at least one vertical alternative section;

~~repeating process (A) for~~dividing the traversed area into cells;

processing each candidate flight path~~;~~, comprising:

B. for each cell along the candidate flight path:

determining whether there is a conflict between an altitude restriction characterizing the cell indicative of a topographical constraints, and a predicted altitude range of the aircraft when traversing the cell; the predicted altitude range of the aircraft when traversing the cell is calculated based on data including glide ratio of the aircraft;

and should such conflict exist,

determining one or more alternative sections circumventing the cell; and generating one or more additional candidate flight paths, each comprising an alternative section, together with one or more previous sections leading to the alternative section; wherein in case the vertical maneuverability allows the aircraft to vertically circumvent the cell, the one or more alternative sections comprises at least one vertical alternative section;

selecting a preferred flight path from among the one or more candidate flight paths and the one or more additional candidate flight paths; and

generating instructions to aerial control devices for guiding the aircraft along the flight path.

2. The method of claim 1 further comprising:

determining whether ~~the~~an entire airspace in the restricted area is prohibited for flight, and if so, determining one or more horizontal alternative sections circumventing the restricted area.

~~3. The method of any one of the preceding claims, wherein the one or more alternative sections comprise one or more alternative vertical sections for circumventing the restricted area from above or below.~~

~~4.~~3. The method of any one of the preceding claims, wherein the one or more alternative sections comprise one or more alternative horizontal sections for circumventing the restricted area from one or both sides.

~~5. The method of any one of the preceding claims, wherein restricted areas are characterized by any one of: 2D flight constraints; 3D flight constraints; and topographical flight constraints.~~

~~6.~~4. The method of any one of the preceding claims, wherein process (A) further comprises: assigning a respective weight to each one of the one or more alternative sections; the respective weight representing one or more cost parameters;

wherein selecting ~~a preferred flight path,~~ the preferred flight path which is selected, comprises one or more alternative sections and is characterized by an acceptable overall cost value calculated based on the respective weights assigned to the one or more alternative sections.

~~7.~~5. The method of any one of the preceding claims, wherein ~~calculating the predicted altitude range when traversing the restricted area~~the target position is ~~based on~~ a ~~glide ratio of the aircraft~~landing window.

~~8.~~6. The method of any one of the preceding claims, wherein the aircraft is a UAV.

~~9.~~7.

~~10.~~ The method of any one of the preceding claims, wherein the ~~data indicative of a~~ need to autonomously ~~navigate the aircraft includes data indicative of~~calculate a flight path arises as a ~~need to unexpectedly land the aircraft; the method further comprising:~~

~~determining~~result from a ~~landing site,~~mechanical failure and wherein the ~~target position~~ vertical maneuverability of the aircraft is ~~located near the landing site~~determined according to the mechanical failure.

~~11.~~8. The method of claim ~~9~~1 further comprising:

identifying at least two potential landing sites;

determining two or more initial flight paths, each leading from a current position of the aircraft to a target position determined according to a respective landing site;

performing process (A) for each initial flight path to thereby obtain a plurality of preferred flight paths, each leading to a respective landing site; and

selecting a final flight path and a respective landing site from among the plurality of preferred flight paths.

~~12.~~9.

~~13.~~ The method of any one of the preceding claims, wherein ~~process (A) further comprises:~~

~~determining whether any of the candidate flight paths intersects a topographical constraint; wherein the traversed area is divided into cells, each cell is classified as traversable or non-traversable, and wherein a cell that comprises topography that obstructs flight of the aircraft is classified as non-traversable;~~

~~for each non-traversable cell along a candidate flight path, determining~~the one or more alternative sections ~~circumventing the non-traversable cell; each alternative section, when incorporated in the candidate flight path, represents an additional candidate flight path;~~

~~repeating process (A) for each candidate flight path; selecting the preferred flight path from among the candidate flight paths and the additional candidate flight paths; and~~

~~generating instructions~~are extended between vertices of a polygon defining the restricted area and/or between points tangential to ~~aerial control devices for guiding the aircraft along the flight path~~a curved shaped restricted area.

~~14.~~10. A system mountable on an aircraft for ~~enabling autonomous control over~~autonomously controlling the aircraft; the system comprising a processing ~~circuitry~~circuitry configured to:

in response to data indicative of a need to ~~autonomously navigate~~unexpectedly land the aircraft, calculate a flight path from a current position of the aircraft to a target position of the aircraft located near a landing site, the calculation comprising:

determining an initial flight path leading from a current position to the target position;

determining vertical maneuverability of the aircraft;

processing of the initial flight path, the processing comprising:

A. determining whether there is one or more restricted areas located along the flight path;

for each restricted area:

calculating a predicted altitude range of the aircraft when traversing the restricted area;

determining whether there is a conflict between an altitude restriction characterizing the restricted area and the predicted altitude range;

and should such conflict exist,

determining one or more alternative sections circumventing the restricted area; ~~each~~and generating one or more candidate flight paths, each comprising an alternative section, together with one or more previous sections leading to the alternative section~~, represent a candidate flight path; ~~;

wherein in case the vertical maneuverability allows the aircraft to vertically circumvent the restricted area, the one or more

alternative sections comprises at least one vertical alternative section;

~~repeating process (A) for~~dividing the traversed area into cells;

processing each candidate flight path~~;~~, comprising:

B. ~~———~~for each cell along the candidate flight path:

determining whether there is a conflict between an altitude restriction characterizing the cell indicative of a topographical constraints, and a predicted altitude range of the aircraft when traversing the cell; the predicted altitude range of the aircraft when traversing the cell is calculated based on data including glide ratio of the aircraft;

and should such conflict exist,

determining one or more alternative sections circumventing the cell; and generating one or more additional candidate flight paths, each comprising an alternative section, together with one or more previous sections leading to the alternative section; wherein in case the vertical maneuverability allows the aircraft to vertically circumvent the cell, the one or more alternative sections comprises at least one vertical alternative section;

selecting a preferred flight path from among the one or more candidate flight paths and the one or more additional candidate flight paths; and

generating instructions to aerial control devices for guiding the aircraft along the flight path.

~~15.~~11. The system of claim ~~12~~10, wherein the processing circuitry is further configured to determine whether ~~the~~an entire airspace in the restricted area is prohibited for flight, and if so, determine one or more horizontal alternative sections circumventing the restricted area.

~~16.~~12.

~~17. The system of any one of claims 12 to 14, wherein the one or more alternative sections comprise one or more alternative vertical sections for circumventing the restricted area from above or below.~~

~~The system of any one of claims 12 to 16~~10 to 11, wherein the one or more alternative sections comprise one or more alternative horizontal sections for circumventing the restricted area from one or both sides.

~~18.~~13. The system of any one of claims ~~12~~10 to ~~15~~12, wherein the processing circuitry is further configured to assign a respective weight to each one of the one or more alternative sections; the respective weight representing one or more cost parameters;

~~select a preferred flight path,~~wherein the preferred flight path comprises one or more alternative sections and is characterized by an acceptable overall cost value calculated based on the respective weights assigned to the one or more alternative sections.

~~19. The system of any one of claims 12 to 16, wherein calculating the predicted altitude range when traversing the restricted area is based on a glide ratio of the aircraft.~~

~~20. The system of any one of claims 12 to 17, wherein the processing circuitry is further configured to:~~

~~determine whether any of the candidate flight paths intersects a topographical constraint; wherein the traversed area is divided into cells, each cell is classified as traversable or non-traversable and wherein a cell that comprises topography that obstructs flight of the aircraft is classified as non-traversable;~~

~~for each non-traversable cell along a candidate flight path, determining one or more alternative sections circumventing the non-traversable cell; each alternative section, when incorporated in the candidate flight path, represents an additional candidate flight path;~~

~~repeat process (A) for each candidate flight path; selecting the preferred flight path from among the candidate flight paths and the additional candidate flight paths; and~~

~~generate instructions to aerial control devices for guiding the aircraft along the flight path.~~

~~21. The system of any one of claims 12 to 18, wherein the data indicative of a need to autonomously navigate the aircraft includes data indicative of a need to unexpectedly land the aircraft; the processing circuitry is further configured to:~~

~~determine a landing site, wherein the target position is located near the landing site.~~

~~22.~~14. The system of claim ~~19~~13, wherein the processing circuitry is further configured to identify at least two potential landing sites;

determine two or more initial flight paths, each leading from a current position of the aircraft to a target position determined according to a respective landing site;

perform process (A) for each initial flight path to thereby obtain a plurality of preferred flight paths, each leading to a respective landing site;

selecting a final flight path and a respective landing site from among the plurality of preferred flight paths.

15. The system of any one of claims 10 to 14 is mounted on a UAV.

16. The system of any one of claims 10 to 15, wherein the one or more alternative sections are extended between vertices of a polygon defining the restricted area and/or between points tangential to a curved shaped restricted area.

17. The system of any one of claims 10 to 16, wherein the need to autonomously calculate a flight path arises as a result from a mechanical failure and wherein the vertical maneuverability of the aircraft is determined according to the mechanical failure.

~~23.~~18. A computer-readable non-transitory memory device tangibly embodying a program of instructions executable by the computer for executing a

method of autonomous generation of a flight path for an aircraft while traversing an area, the method comprising:

while the aircraft is flying in midair, in response ~~to data indicative of~~ a need to autonomously ~~navigate~~land the aircraft, calculating a flight path from a current position of the aircraft to a target position of the aircraft located near a landing site, the calculation comprising:

determining an initial flight path leading from a current position to the target position;

determining vertical maneuverability of the aircraft

processing of the initial flight path, ~~the processing~~ comprising:

A. determining whether there is one or more restricted areas located along the flight path;

for each restricted area:

calculating a predicted altitude range of the aircraft when traversing the restricted area;

determining whether there is a conflict between an altitude restriction characterizing the restricted area and the predicted altitude range;

and ~~,~~should such ~~a~~ conflict exist,

determining one or more alternative sections circumventing the restricted area; ~~each~~and generating one or more candidate flight paths, each comprising an alternative section, together with one or more previous sections leading to the alternative section~~, represent a candidate flight path; ~~;

wherein in case the vertical maneuverability allows the aircraft to vertically circumvent the restricted area, the one or more alternative sections comprises at least one vertical alternative section;

~~repeating process (A) for~~dividing the traversed area into cells;

processing each candidate flight path~~;~~, comprising:

B. for each cell along the candidate flight path:

determining whether there is a conflict between an altitude restriction characterizing the cell indicative of a topographical constraints, and a predicted altitude range of the aircraft when traversing the cell; the predicted altitude range of the aircraft when traversing the cell is calculated based on data including glide ratio of the aircraft;

and should such conflict exist,

determining one or more alternative sections circumventing the cell; and generating one or more additional candidate flight paths, each comprising an alternative section, together with one or more previous sections leading to the alternative section; wherein in case the vertical maneuverability allows the aircraft to vertically circumvent the cell, the one or more alternative sections comprises at least one vertical alternative section;

selecting a preferred flight path from among the one or more candidate flight paths and the one or more additional candidate flight paths; and

generating instructions to aerial control devices for guiding the aircraft along the flight path.