CLAIMS

1. An array antenna configured to be placed at a determined position above a ground surface, said array antenna comprising: a plurality of unmanned aerial vehicles (UAVs) assembled together, each of said plurality of UAVs carrying one or more antenna elements of said array antenna a control unit configured and operable to control movement of said UAV for accurately maintaining the UAV in position within a selected formation of the plurality of UAVs above the ground surface, and at least one imager/camera configured to acquire imagery data of other UAVs of the plurality of UAVs in the formation, said plurality of UAVs configured to create a defined formation at said determined position above the ground and thereby align the one or more antenna elements carried by the plurality of UAVs to form said array antenna, said array antenna configured to receive electromagnetic signals reflected from a region of interest, or from one or more objects, within a line of sight thereof;
wherein the control unit is configured to process said imagery data, determine distances of said UAV from at least one of said other UAVs, and whenever needed, apply correcting movements to said UAV for maintaining said UAV in an accurate position thereof in the formation of UAVs.

2. The array antenna of claim 1 wherein each of the plurality of UAVs comprises at least one receiver configured to receive the electromagnetic signals from the one or more antenna elements.

3. The array antenna of claim 1 wherein a distance between neighboring antenna elements in said array antenna is determined according to a frequency of the electromagnetic signals.

4. The array antenna of claim 1 wherein each of the plurality of UAVs comprises one or more analog-to-digital converters configured to convert the electromagnetic signals received by the one or more antenna elements of the UAV into corresponding digital signals.

5. The array antenna of claim 1 wherein each of the plurality of UAVs comprises a data communication unit configured to communicate data with a control center, said

data comprising data indicative of the electromagnetic signals received by the one or more antenna elements of said UAV.

6. The array antenna of claim 1 wherein each of the plurality of UAVs comprises an accurate clock device for synchronizing between the electromagnetic signals received by the one or more antenna elements of the different UAVs in the formation.

7. The array antenna of claim 1 wherein at least one of the plurality of UAVs comprises a global positioning system (GPS) unit configured to generate location data indicative of a location of said UAV, and wherein the control unit is configured to receive position data indicative a target location of said UAV in space, and control movement of said UAV for placing said UAV at said target location based on the location data received from the GPS unit.

8. The array antenna of claim 1 wherein the control unit is configured to receive data indicative of a position in which the UAV needs to be in the formation, and if needed, apply correcting movements to said UAV based on the imagery data from the one or more imagers/cameras for accurately placing the UAV in its position in the formation.

9. The array antenna of claim 1 wherein the control unit is configured to use local positioning systems to position and maintain the UAV in a location thereof in the formation.

10. The array antenna of claim 1 wherein at last one of the plurality of UAVs comprises combustion engine(s).

11. A radar system utilizing the array antenna of claim 1 as a receiving antenna, said radar system comprising one or more transmitting antennas mounted on land and/or aerial structures for transmitting electromagnetic signals towards one or more objects and/or a region-of-interest (ROI) within the line of sight of the array antenna.

12. The radar system of claim 11 wherein the one more transmitting antennas are mounted on respective one or more transmitting UAVs (Tx-UAVs), said Tx-UAVs are not part of the UAV formation creating the receive array antenna of the system.

13. The radar system of claim 12 wherein each of the one or more Tx-UAVs is connected by an electrical cable to a ground station, said electric cable configured to communicate signals/data and/or instructions between said Tx-UAV and said ground station.

14. The radar system of claim 13 wherein the Tx-UAV is operated by electrical engine(s), and wherein said electric cable is configured to provide electrical power to said electrical engine(s).

15. The radar system of claim 12 wherein the Tx-UAV is operated by combustion engine(s).

16. The radar system of claim 11, further comprising a control center configured to transmit to the UAVs data indicative of a location at which at least one of said plurality of UAVs is to be positioned.

17. The radar system of claim 16 wherein the control center configured to transmit to the plurality of UAVs data indicative of at least one of the following: at least one required geometrical dimension of the array antenna; a required aperture of the array antenna; a required orientation of at least one of the plurality of UAVs; a required broadside of the array antenna; or a required new position of the array antenna, and wherein the control units of the plurality of UAVs are configured to adjust locations of one or more of the plurality of UAVs accordingly.

18. A method of constructing an array antenna, the method comprising:

launching a plurality of unmanned aerial vehicles (UAVs), each of said plurality of UAVs comprising at least one antenna element and receiver configured to receive electromagnetic signals reflected from a region-of-interest (ROI) and/or at least one object;

determining location and at least one geometrical dimension of said array antenna and transmitting to each UAV respective position data to arrange said plurality of UAVs in a formation to thereby construct said array antenna having the at least one geometrical dimension at the determined location; and using at least one of the plurality of UAVs to acquire imagery data of at least another one of said plurality of UAVs, processing said imagery data to determine a distance of said at least another one of the plurality of UAVs, and controlling one or more of the plurality of UAVs to adjust locations thereof based on the determined distance.

19. The method of claim 18, further comprising transmitting to the plurality of UAVs data indicative of at least one of the following: a required aperture of the array antenna; a required orientation of at least one of the plurality of UAVs; a required broadside of the array antenna; or a required new position of the array antenna, and controlling one or more of the plurality of UAVs to adjust their locations and/or orientations accordingly.

20. The method of claim 18, further comprising using a global positioning system to determine location of at least one of the plurality of UAVs, and controlling one or more of the plurality of UAVs to adjust locations thereof based on the determined location.

21. The method of claim 18, further comprising using a local positioning system to determine location of at least one of the plurality of UAVs, and controlling one or more of the plurality of UAVs to adjust locations thereof based on the determined location.

22. The method of claim 18, further comprising transmitting by each of the plurality of UAVs data indicative of the electromagnetic signals received by at least one antenna element thereof to a control center.

23. The method of claim 18, further comprising accurately determining a time of arrival of the electromagnetic signal received in the at least one antenna element of each one of said plurality of UAVs.

24. The method of claim 18, further comprising identifying at least one malfunctioning or energy depleted UAV in the plurality of UAVs, launching respective

at least one new UAV towards the plurality of UAVs formation for replacing said at least one malfunctioning or energy depleted UAV.

25. The method of claim 24, further comprising removing the at least one malfunctioning or energy depleted UAV from the UAVs formation, and controlling one or more of the plurality of UAVs to adjust locations thereof to construct a new formation of the remaining UAVs of the plurality of UAVs, to thereby construct a new array antenna structure.

26. The method of claim 25, further comprising introducing the respective at least one new UAV into the new formation to thereby restore an original formation of the UAVs, or construct a new modified new array antenna structure.

27. The method of claim 18, further comprising controlling one or more of the plurality of UAVs to adjust locations thereof to thereby adjust at least one geometrical dimension of the array antenna to comply to a frequency of the electromagnetic signals.

28. The method of claim 18, further comprising transmitting by one or more transmitters and respective antenna elements electromagnetic signal towards the ROI and/or at least one object.

29. The method of claim 28 wherein each of the one or more transmitters and respective antenna elements is mounted on a transmitting UAV (Tx-UAV), the method further comprising launching said one or more Tx-UAVs, transmitting to each of said one or more Tx-UAVs data indicative of a required position of said Tx-UAV and direction of transmittal thereof, and controlling one or more of the Tx-UAVs to adjust their locations and/or orientations accordingly.

30. The method of claim 29, further comprising transmitting to at least one of the Tx-UAVs data indicative of at least one of a required orientation of said at least one Tx-UAV and a required position of said at least one Tx-UAV, and controlling said at least one Tx-UAV to adjust its location and/or orientation accordingly.

31. A control system of an array antenna, said control system comprising:

a control unit; and

one or more transceivers and antennas configured to communicate data with at a plurality of unmanned aerial vehicles (UAVs), each of said plurality of UAVs comprising at least one antenna element and receiver configured to receive electromagnetic signals reflected from a region-of-interest (ROI) and/or one or more objects, and at least one transceiver and antenna element configured to communicate the data with said control unit,

wherein said control unit is configured to receive from each of said plurality of UAVs data indicative of electromagnetic signals received by at least one antenna element thereof, and to transmit to said plurality of UAVs position data for constructing a formation and thereby form an array antenna structure by the at least one antenna element of each of said plurality of UAVs; and wherein the control unit is configured to communicate data with at least one Tx-UAV, each of said at least one Tx-UAV having one or more transmitters and antenna elements for transmitting the electromagnetic signals towards the ROI and/or the one or more objects, and at least one receiver and antenna for receiving data from said control center, said control center configured to transmit to said at least one Tx-UAV data indicative of at least one of a required orientation of said at least one Tx-UAV and a required position of said at least one Tx-UAV.

32. The control system of claim 31 wherein the control unit is configured to transmit to the plurality of UAVs data indicative of at least one of the following: at least one required geometrical dimension of the array antenna; a required aperture of the array antenna; a required orientation of at least one of the UAVs; a required broadside of the array antenna; or a required new position of the array antenna, and control motion of said UAVs to adjust locations one or more of the UAVs accordingly.