CLAIMS

1. A device for calibrating a radar or an antenna, said device being configured to be embedded on an aerial vehicle, the device being configured to receive at least one electromagnetic signal, the device comprising:

processor and memory circuitry,

wherein the aerial vehicle is configured to move along a plurality of different positions relative to said at least one radar or antenna,

wherein, for each given position of the plurality of different positions: the device is configured to delay said at least one electromagnetic signal to simulate a virtual range of the device or of the aerial vehicle with respect to said at least one radar or antenna, said virtual range being different from an actual range of the device or of the aerial vehicle located at said given position with respect to said at least one radar or antenna, and

wherein the processor and memory circuitry is configured to perform a modulation of said at least one electromagnetic signal before its back transmission to simulate a virtual radial velocity of the device or of the aerial vehicle which is different from an actual radial velocity of the device or of the aerial vehicle,

wherein the actual radial velocity is equal to or below a velocity threshold for which said at least one radar or antenna does not detect a target,

wherein the virtual radial velocity is higher than the velocity threshold, thereby enabling detection of the device or of the aerial vehicle by said at least one radar or antenna,

wherein the device is configured to provide said at least one electromagnetic signal after said delay and said modulation to an emitter for its back transmission, thereby obtaining at least one transmitted electromagnetic signal, and

wherein said at least one transmitted electromagnetic signal, which simulates a virtual range of the device or of the aerial vehicle with respect to said at least one radar or antenna and a virtual radial velocity of the device or of the aerial vehicle, is usable to calibrate said at least one radar or antenna.

2. The device of claim 1, configured to control said delay so as to make it vary over time according to one or more delay values, wherein each delay value simulates a virtual range of the device or of the aerial vehicle with respect to at least one radar receiving

said at least one transmitted electromagnetic signal, said virtual range being different from an actual range of the device or of the aerial vehicle with respect to said at least one radar or antenna, for calibrating said at least one radar or antenna based on said at least one transmitted electromagnetic signal which simulates a virtual range of the device or of the aerial vehicle with respect to said at least one radar or antenna.

3. The device of claim 1, configured to apply a given delay when at least one of the device and the aerial vehicle is in a proximity zone of the radar or antenna or enters a proximity zone of the radar or antenna, wherein said given delay simulates a virtual range of the device or of the aerial vehicle which is out of said proximity zone.

4. The device of claim 1, configured to communicate with a memory storing data representative of delay values, wherein data representative of each delay value is associated with data representative of the flight path of the aerial vehicle, wherein the device is configured to delay the at least one electromagnetic signal based at least on said data representative of delay values and said data representative of the flight path of the aerial vehicle.

5. The device of claim 1, wherein the calibration includes at least one of: bias calibration, and power loss or energy loss calibration.

6. The device of claim 1, wherein a change in a virtual range of the device or of the aerial vehicle in a given period of time is different from a simulated radial velocity of the device or of the aerial vehicle in said given period of time.

7. The device of claim 1, wherein the processor and memory circuitry is configured to modulate said electromagnetic signal when the aerial vehicle has a flight path with a substantially constant elevation angle with respect said at least one radar or antenna, and a varying azimuth angle, for calibrating the radar or antenna along an azimuth direction.

8. The device of claim 1, configured to simulate a virtual trajectory of the device or of the aerial vehicle with respect to the radar or the antenna, said simulation comprising performing at least one of:

controlling the delay according to one or more delay values, wherein each delay value simulates a virtual range of the device or of the aerial vehicle with respect to said radar or antenna, said virtual range being different from an actual range of the device or of the aerial vehicle with respect to said radar or antenna, and

applying a modulation to said at least one electromagnetic signal, in order to simulate a virtual radial velocity of the device or of the aerial vehicle, said virtual radial velocity being different from an actual radial velocity of the device or of the aerial vehicle.

9. The device of claim 1, wherein said device is embedded on an unmanned aerial vehicle.

10. A system for calibrating a radar or an antenna, comprising:

a device according to claim 1, said device being embedded on an unmanned aerial vehicle, and

an additional processor and memory circuitry configured to compare data representative of the position of the aerial vehicle calculated by said at least one radar or antenna with data representative of the position of the aerial vehicle, for calibrating said at least one radar or antenna.

11. The system of claim 10, wherein the data representative of the position of the aerial vehicle is calculated by one or more additional pre-calibrated radars.

12. A system for synchronizing a plurality of radars or antennas, wherein said plurality of radars or antennas comprises at least one active radar or antenna and at least one receiving radar or antenna, wherein said system comprises:

the device according to claim 1, said device being embedded on an unmanned aerial vehicle, and

a processor and memory circuitry configured to determine a clock offset between a clock of the active radar or antenna and a clock of the receiving radar or antenna, based on electromagnetic signals sent by the active radar or antenna, sensed by the device and transmitted back towards the receiving radar or antenna, and based on data representative of the position of the device or of the unmanned aerial vehicle.

13. A system for calibrating a radar or an antenna, comprising:

the device according to claim 1, said device being embedded on an unmanned aerial vehicle, and

an additional processor and memory circuitry configured to determine, based on the electromagnetic signal transmitted by the device, at least one of data representative of the beam emitted by the radar or antenna, and data representative of coefficients of radiating elements of the antenna, said coefficients being representative of the phase or amplitude modification applied by said radiating elements to signals of the radar or antenna, before their transmission.

14. An unmanned aerial vehicle comprising the device of claim 1.

15. A method of calibrating at least one radar or antenna, the method comprising:

for an aerial vehicle moving along a plurality of different positions relative to said at least one radar or antenna, performing, for each given position of the plurality of different positions:

receiving an electromagnetic signal with a device mounted on the aerial vehicle,

delaying the electromagnetic signal by said device to simulate a virtual range of the device or of the aerial vehicle with respect to said at least one radar or antenna, said virtual range being different from an actual range of the device or of the aerial vehicle located at said given position with respect to said radar or antenna, and

performing a modulation of said electromagnetic signal before its back transmission to simulate a virtual radial velocity of the device or of the aerial vehicle which is different from an actual radial velocity of the device or of the aerial vehicle, wherein the actual radial velocity is equal to or below a velocity threshold for which said at least one radar or antenna does not detect a target, wherein the virtual radial velocity is higher than the velocity threshold, thereby enabling detection of the device or of the aerial vehicle by said at least one radar or antenna,

transmitting the electromagnetic signal after said delay and said modulation to an emitter for its back transmission, thereby obtaining a transmitted electromagnetic signal, wherein said transmitted electromagnetic signal, which simulates a virtual range of the device or of the aerial vehicle with respect to said at least one radar or antenna and a virtual radial velocity of the device or of the aerial vehicle, is usable to calibrate said at least one radar or antenna.

16. The method of claim 15, comprising controlling said delay so as to make it vary over time according to one or more delay values, wherein each delay value simulates a virtual range of the device or of the aerial vehicle with respect to at least one radar receiving said transmitted electromagnetic signal, said virtual range being different from an actual range of the device or of the aerial vehicle with respect to said at least one radar or antenna, for calibrating said at least one radar or antenna based on said transmitted electromagnetic signal which simulates a virtual range of the device or of the aerial vehicle with respect to said at least one radar or antenna.

17. The method of claim 15, comprising applying a given delay when at least one of the device and the aerial vehicle is in a proximity zone of the radar or antenna or enters a proximity zone of the radar or antenna, wherein said given delay simulates a virtual range of the device or of the aerial vehicle which is out of said proximity zone.

18. The method of claim 15, wherein a change in a virtual range of the device or of the aerial vehicle in a given period of time is different from a simulated radial velocity of the device or of the aerial vehicle in said given period of time.