

- 18 -

**CLAIMS:**

1. An antenna device comprising: a conformal antenna body which has a desired geometry corresponding to a front portion of a platform on which the antenna device is to be mounted, and an antenna unit carried by the antenna body, the antenna unit  
5 comprising at least one phased array of antenna elements, the antenna elements of each of said at least one array being arranged in a spaced-apart relationship in a closed loop path along a circumference of the antenna body having a desired geometry corresponding to a front portion of platform on which the antenna unit is to be mounted, each of the antenna elements is configured as an end-fire antenna element capable of emitting linearly  
10 polarized radiation, the array of the antenna elements being thereby operable as a forward looking end-fire antenna array, enabling electronic steering of an antenna beam by controllably modifying phases of the antenna elements of each array.
2. The antenna device according to claim 1, wherein the antenna body has a substantially cylindrical shape, the antenna unit being spaced a predetermined distance  
15 from a base region of the cylindrical antenna body.
3. The antenna device according to claim 1, wherein the antenna body has a substantially conical shape, the antenna unit being spaced a predetermined distance from an apex region of the antenna body.
4. The antenna device according to claim 1, wherein the antenna body is configured  
20 as at least a part of a substantially spherical shape.
5. The antenna device according to claim 1, wherein the antenna body has a distal substantially conical portion and a proximal substantially tubular portion, the antenna elements of said at least one antenna unit being arranged in at least one of the distal and proximal portions of the antenna body, being spaced a predetermined distance from an  
25 apex region of the conical distal portion.
6. The antenna device according to any one of the preceding claims, wherein the antenna body is made of a metallic material.

- 19 -

7. The antenna device according to any one of the preceding claims, wherein the antenna elements in the antenna array are equally spaced from one another along said closed loop path.
8. The antenna device according to any one of the preceding claims, wherein the  
5 antenna unit comprises two or more of the antenna arrays arranged in a spaced-apart relationship along a longitudinal axis of the antenna body.
9. The antenna device according to claim 8, wherein the different antenna arrays have the same number of antenna elements.
10. The antenna device according to claim 8, wherein the antenna arrays comprises  
10 arrays having different number of antenna elements.
11. The antenna device according to claim 9 or 10, wherein the antenna elements of different antenna arrays comprises the antenna elements of the same geometry.
12. The antenna device according to claim 9 or 10, wherein the antenna elements of different antenna arrays comprises the antenna elements of different geometries.
- 15 13. The antenna device according to any one of the preceding claims, wherein each of the antenna elements of said at least one antenna unit is associated with a respective operational module comprising a phase shifting utility.
14. The antenna device according to claim 13, comprising a phase control circuit in communication with the operational modules of the antenna elements for controlling  
20 phases of all the antenna elements of the antenna unit to provide a predetermined phase pattern providing a desired radiating beam of the antenna unit in accordance with a selected radiation direction.
15. The antenna device according to claim 14, wherein the phase control circuit is configured and operable for providing a predetermined phase pattern of the antenna unit  
25 resulting in a circular polarization of the antenna radiation of said antenna elements.
16. The antenna device according to claim 15, wherein the phases of the antenna elements in the antenna unit are shifted one with respect to the other along a circular direction, such that each successive antenna element in said direction has a phase shifted by a predetermined value with respect to a preceding antenna element.

- 20 -

17. The antenna device according to claim 14, wherein the phases of the antenna elements in the array are shifted by a phase shift  $\Delta\varphi$  between each two successive antenna elements in the antenna array of  $n$  elements array a value determined as  $\Delta\varphi=2\pi/n$ .

18. The antenna device according to claim 17, wherein said phase pattern corresponds  
5 to the antenna unit operation in a forward-looking direction.

19. The antenna device according to claim 14 or 15, wherein the phases of all the antenna elements are controlled to be substantially the same, for each radiation direction in an angular range from about zero up to about 40 degrees of radiation directions.

20. The antenna device according to claim 14, wherein the phases of all the antenna  
10 elements are controlled to be substantially the same, for each radiation direction in an angular range of about 40 degrees or higher, for circular or arbitrary linear polarization of the antenna radiation.

21. The antenna device according to any one of the preceding claims, comprising an additional antenna unit comprising one or more phase arrays of antenna elements  
15 configured with a boresight substantially perpendicular to a longitudinal axis of the antenna body.

22. A sensing system comprising the antenna device of any one of the preceding claims, and one or more additional sensor device comprising at least one of optical and RF sensor elements.