CLAIMS

1. An aerial vehicle comprising:

an airframe comprising a central member defining a longitudinal axis;

a gimbal coupled to the central member;

a camera mounted on the gimbal to face a direction at least substantially orthogonal to the longitudinal axis;

wherein the gimbal is rotatable about the longitudinal axis to spin the camera around the longitudinal axis; ~~and~~

a propulsion means configured to propel the aerial vehicle, wherein the propulsion means is offset from the camera along the longitudinal axis; and

a processor configured to control a rotation speed of the gimbal based on a velocity of the aerial vehicle.

2. The aerial vehicle of claim 1, wherein the airframe further comprises a plurality of arms coupled to the central member, wherein each arm of the plurality of arms is offset from the camera along the longitudinal axis.

3. The aerial vehicle of claim 2, wherein each arm has a first end and a second end opposing the first end, wherein the first end is coupled to the central member and wherein the second end is separated from the central member.

4. The aerial vehicle of claim 3, wherein a distance between the first end and the camera along the longitudinal axis is smaller than a distance between the second end and the camera along the longitudinal axis.

5. The aerial vehicle of any one of claims 2 to 4, wherein the propulsion means comprises a respective rotor coupled to each arm, wherein rotor is offset from the camera along the longitudinal axis.

6. The aerial vehicle of claim 5, wherein each rotor comprises a propeller arranged to spin about a propeller axis, wherein the propeller axis is at least substantially orthogonal to the longitudinal axis.

7. The aerial vehicle of any one of claims 2 to 6, wherein the airframe comprises four arms arranged symmetrically about the longitudinal axis, wherein the propulsion means comprises four rotors.

8. The aerial vehicle of any one of claims 2 to 7, wherein each arm is a straight elongated structure.

9. The aerial vehicle of any one of claims 1 to 8, wherein the central member is elongated along the longitudinal axis.

10. The aerial vehicle of any one of claims 1 to 9, wherein the gimbal is rotatable through 360° about the longitudinal axis.

11. The aerial vehicle of any one of claims 1 to 10, wherein the camera is fixed with respect to the gimbal.

~~12. The aerial vehicle of any one of claims 1 to 11, further comprising a processor configured to control a rotation speed of the gimbal based on a velocity of the aerial vehicle.~~

~~13~~12. The aerial vehicle of any one of claims 1 to ~~12~~11, further comprising:

a range sensor coupled to the camera, wherein the range sensor is configured to measure a distance between the camera and a nearest surface from the camera.

~~14~~13. The aerial vehicle of any one of claims 1 to ~~13~~12, wherein the central member comprises a cavity, wherein the gimbal is housed inside the cavity.

~~15~~14. The aerial vehicle of claim ~~14~~13, wherein the central member comprises a transparent window at least substantially longitudinally aligned with the camera.

~~16~~15. The aerial vehicle of any one of claims 1 to ~~15~~14, wherein the gimbal is configured to rotate continuously as the aerial vehicle is moving at least substantially along the longitudinal axis, such that the camera captures a spiral panoramic image.

~~17~~16. The aerial vehicle of any one of claims 1 to ~~16~~15, further comprising:

a plurality of range sensors, each range sensor mounted on a respective position on the airframe and configured to measure a distance between the respective position and a nearest surface from the respective position;

a memory storing geometrical information about an enclosed space;

a processor configured to determine a planar position of the aerial vehicle in the enclosed space based on measurements from the plurality of range sensors and further based on the geometrical information.

~~18. A method of imaging a tunnel, the method comprising:~~

~~flying an aerial vehicle along a lengthwise direction of the tunnel;~~

~~wherein the aerial vehicle comprises an airframe defining a longitudinal axis, a gimbal coupled to the airframe and a camera mounted on the gimbal to face a direction at least substantially orthogonal to the longitudinal axis;~~

~~wherein the longitudinal axis is at least substantially parallel to the lengthwise direction when the aerial vehicle is in flight;~~

~~rotating the gimbal while the aerial vehicle is in flight such that the camera revolves around the longitudinal axis to capture a spiral panoramic image; and~~

~~reconstructing a virtual three-dimensional model of the tunnel based on the spiral panoramic image.~~

~~19. The method of claim 18, further comprising:~~

~~obtaining measurements from a range sensor coupled to the camera;~~

~~reconstructing the virtual three-dimensional model further based on the measurements.~~

~~20. A method of imaging a shaft, the method comprising:~~

~~flying an aerial vehicle along a depthwise direction of the shaft;~~

~~wherein the aerial vehicle comprises an airframe defining a longitudinal axis, and a camera mounted on the airframe to face a direction at least substantially orthogonal to the longitudinal axis;~~

~~wherein the longitudinal axis is at least substantially parallel to the depthwise direction when the aerial vehicle is in flight;~~

rotating the aerial vehicle about the longitudinal axis while the aerial vehicle is in flight such that the camera revolves around the longitudinal axis to capture a spiral panoramic image; and

reconstructing a virtual three-dimensional model of the shaft based on the spiral panoramic image.

21. A method of locating an aerial vehicle in an enclosed space, the method comprising:

storing geometrical information about the enclosed space in a memory;

measuring a plurality of distances using a plurality of range sensors, each range sensor mounted on a respective position on the airframe;

wherein each measured distance is a distance between the respective position and a nearest surface of the enclosed space from the respective position; and

determining a planar position of the aerial vehicle based on the measured distances and the geometrical information.