CLAIMS

1. A sensor array having a plurality of sensor rows, each sensor row comprising:

a LIDAR sensor channel; and

a set of one or more ambient light sensor channels, wherein each ambient light sensor channel includes:

a channel input aperture;

a photosensor; and

a channel specific optical filter that selectively passes light having a channel specific property to the photosensor.

2. The sensor array of claim 1 wherein the set of one or more ambient light sensor channels includes at least two ambient light sensor channels, each having a different channel specific optical filter.

3. The sensor array of claim 1 wherein the set of ambient light sensor channels includes a white channel in which the channel specific optical filter has a passband that encompasses at least the visible light spectrum.

4. The sensor array of claim 1 wherein the set of ambient light sensor channels includes a red channel in which the channel specific optical filter selectively passes red light, a green channel in which the channel specific optical filter selectively passes green light, and a blue channel in which the channel specific optical filter selectively passes blue light.

5. The sensor array of claim 1 wherein the set of ambient light sensor channels includes at least five different color channels, wherein the channel specific optical filter for each of the at least five different color channels selectively passes light having a different range of wavelengths.

6. The sensor array of claim 1 wherein the set of ambient light sensor channels includes:

a first color channel having a first channel specific optical filter that selectively passes light having a first range of wavelengths; and

a second color channel having a second channel specific optical filter that selectively passes light having a second range of wavelengths,

wherein the first range and the second range are overlapping ranges.

7. The sensor array of claim 6 wherein the second range corresponds to an absorption band of a particular substance and the first range encompasses the second range.

8. The sensor array of claim 1 wherein the set of ambient light sensor channels includes one or more polarization channels in which the channel specific optical filter selectively passes light having a particular polarization property.

9. The sensor array of claim 1 wherein the set of ambient light sensor channels includes:

one or more color channels, wherein the channel specific optical filter for each of the one or more color channels selectively passes light having a different range of wavelengths; and

one or more polarization channels in which the channel specific optical filter selectively passes light having a particular polarization property.

10. The sensor array of claim 1 wherein the set of one or more ambient light sensor channels includes at least two ambient light sensor channels, each having a different channel specific optical filter, and wherein the ambient light sensor channels in a given sensor row are spaced apart from each other by a uniform pitch.

11. The sensor array of claim 10 wherein the LIDAR sensor channel in a given sensor row is spaced apart from a nearest one of the ambient light sensor channels in the given sensor row by the uniform pitch or by a distance that is an integer multiple of the uniform pitch.

12. The sensor array of claim 11 wherein adjacent sensor rows are spaced apart from each other by the uniform pitch.

13. The sensor array of claim 1 wherein the photosensor of each ambient light sensor channel includes one or more single photon avalanche diodes (SPADs) operated in a photon counting mode and wherein each LIDAR sensor channel also includes one or more SPADs operated in a photon counting mode..

14. The sensor array of claim 1 wherein the sensor array is fabricated as a single ASIC.

15. The sensor array of claim 14 further comprising:

a data buffer disposed within the ASIC and configured to store data from two or more of the LIDAR sensor channels and two or more of the ambient light sensor channels; and

a processing circuit disposed within the ASIC and configured to perform an image processing operation on the data stored in the data buffer.

16. The sensor array of claim 1 wherein at least one of the ambient light sensor channels is a multispectral sensor channel that includes:

a plurality of photosensors; and

a patterned optical filter wherein different portions of the patterned optical filter selectively pass light having different properties to different subsets of the plurality of photosensors in the multispectral sensor channel.

17. The sensor array of claim 16 wherein the different portions of the patterned optical filter include a first portion that passes light in a first wavelength band and a second portion that passes light in a second wavelength band.

18. A ranging/imaging system comprising:

a stationary base;

a sensor array rotationally coupled to the stationary base, the sensor array having a plurality of sensor rows, each sensor row including:

a LIDAR sensor channel; and

a set of one or more ambient light sensor channels, wherein each ambient light sensor channel includes:

a channel input aperture;

a photosensor; and

a channel specific optical filter that selectively passes light having a channel specific property to the photosensor;

a bulk optical module disposed in front of the sensor array and configured to focus incident light on an aperture plane common to the LIDAR sensor channels and the ambient light sensor channels; and

a controller to synchronize rotation of the sensor array and operation of the photosensors such that a given location in space relative to the stationary base is successively imaged by the LIDAR sensor channel and each of the ambient light sensor channels in one of the sensor rows.

19. The ranging/imaging system of claim 18 wherein the controller is further configured to generate multispectral image pixel data that includes per pixel light intensity data determined using the ambient light sensor channels of the sensor array and per pixel depth data determined using the LIDAR sensor channels of the sensor array.

20. The ranging/imaging system of claim 18 wherein the ambient light sensor channels in a given sensor row are spaced apart from each other by a uniform pitch and wherein the controller is further configured to rotate the ranging/imaging system such that successive imaging operations occur at angular positions separated by a pitch angle corresponding to the uniform pitch.

21. The ranging/imaging system of claim 20 wherein the LIDAR sensor channel in a given sensor row is spaced apart from a nearest one of the ambient light sensor channels in the given sensor row by the uniform pitch or by a distance that is an integer multiple of the uniform pitch.

22. The ranging/imaging system of claim 21 wherein adjacent sensor rows are spaced apart from each other by the uniform pitch.

23. The ranging/imaging system of claim 18 wherein the set of one or more ambient light sensor channels includes at least two ambient light sensor channels, each having a different channel specific optical filter.

24. The ranging/imaging system of claim 18 wherein the set of ambient light sensor channels includes one or more polarization channels in which the channel specific optical filter selectively passes light having a particular polarization property.

25. The ranging/imaging system of claim 18 wherein the set of ambient light sensor channels includes:

one or more color channels, wherein the channel specific optical filter for each of the one or more color channels selectively passes light having a different range of wavelengths; and

one or more polarization channels in which the channel specific optical filter selectively passes light having a particular polarization property.

26. The ranging/imaging system of claim 18 wherein at least one of the ambient light sensor channels is a multispectral sensor channel that includes:

a plurality of photosensors; and

a patterned optical filter wherein different portions of the patterned optical filter selectively pass light having different properties to different subsets of the plurality of photosensors in the multispectral sensor channel.