CLAIMS

1. An endoscope having a proximal handle assembly and a distal insertion shaft, the handle assembly comprising a proximal housing and a distal housing, the distal housing rotatable relative to the proximal housing about a longitudinal axis of the insertion shaft; the distal housing connected or attached to the insertion shaft so that the insertion shaft is configured to rotate with the distal housing;

wherein a distal end of the insertion shaft includes a camera assembly configured to rotate with the distal housing;

and wherein an electronic processor is mounted on a printed circuit board that is enclosed in the handle assembly and attached or mounted to the distal housing and is configured to receive image data from the camera assembly, the printed circuit board configured to rotate with the distal housing relative to the proximal housing.

2. The endoscope of claim 1, wherein the proximal housing encloses an electronic sensing apparatus that is mounted or attached to the distal housing.

3. The endoscope of claim 2, wherein the electronic sensing apparatus comprises a rotation sensing apparatus configured to provide a rotation signal indicating a rotational position of the distal housing relative to the proximal housing.

4. The endoscope of claim 3, wherein the rotation sensing apparatus comprises a first potentiometer and a second potentiometer, the second potentiometer being rotationally offset from the first potentiometer.

5. The endoscope of claim 3, wherein the rotation sensing apparatus comprises a rotary encoder.

6. The endoscope of claim 5, wherein the rotary encoder comprises a potentiometer, magnetic rotary encoder or optical rotary encoder.

7. The endoscope of claim 5, wherein the rotary encoder comprises a potentiometer having a rotatable keyed shaft, such that the keyed shaft is stationary with respect to the proximal housing and the potentiometer is stationary with respect to the distal housing, or the keyed shaft is stationary with respect to the distal housing and the potentiometer is stationary with respect to the proximal housing.

8. The endoscope of claim 5, wherein the rotary encoder is transversely offset from the longitudinal axis of the insertion shaft.

9. The endoscope of claim 5, wherein the rotary encoder is coupled to a gearbox through which relative rotation of the proximal housing and distal housing is transmitted to the rotary encoder.

10. The rotary encoder of claim 9, wherein an overall gear ratio of the gearbox is 1:1.

11. The endoscope of claim 3, further comprising an image sensor configured to provide an electronic image signal of a field of view of the camera assembly.

12. The endoscope of claim 11, further comprising a controller configured to receive the electronic image signal and the rotation signal, and to generate a display image for display on a display screen.

13. The endoscope of claim 12, wherein the controller controls a rotational orientation of the display image based on a value of the rotation signal.

14. The endoscope of claim 13, wherein the value of the rotation signal is proportional to the degree of relative rotation between the proximal housing and the distal housing.

15. An endoscope having a proximal handle assembly and a distal insertion shaft with a camera sensor located at or near a distal end of the insertion shaft, the handle assembly comprising a proximal housing and a distal housing, the distal housing rotatable relative to the proximal housing about a longitudinal axis of the insertion shaft; and

a processor mounted on a printed circuit board that is enclosed in the handle assembly and attached or mounted to the distal housing, the printed circuit board configured to rotate with the distal housing relative to the proximal housing, and the processor configured to receive image data from the camera sensor;

wherein the distal housing is connected or attached to the insertion shaft so that the insertion shaft rotates about the longitudinal axis with the distal housing.

16. The endoscope of claim 15, wherein the proximal housing encloses an electronic sensing apparatus that is mounted or attached to the distal housing.

17. The endoscope of claim 15, wherein the proximal handle assembly includes a rotation sensing apparatus configured to provide a rotation signal indicating a rotational position of the distal housing relative to the proximal housing.

18. The endoscope of claim 17, wherein the rotation sensing apparatus comprises a first potentiometer and a second potentiometer, the second potentiometer being rotationally offset from the first potentiometer.

19. The endoscope of claim 17, wherein the rotation sensing apparatus comprises a rotary encoder.

20. The endoscope of claim 19, wherein the rotary encoder comprises a potentiometer, magnetic rotary encoder or optical rotary encoder.

21. The endoscope of claim 19, wherein the rotary encoder comprises a potentiometer having a rotatable keyed shaft, such that the keyed shaft is stationary with respect to the proximal housing and the potentiometer is stationary with respect to the distal housing, or the keyed shaft is stationary with respect to the distal housing and the potentiometer is stationary with respect to the proximal housing.

22. The endoscope of claim 19, wherein the rotary encoder is transversely offset from the longitudinal axis of the insertion shaft.

23. The endoscope of claim 19, wherein the rotary encoder is coupled to a gearbox through which relative rotation of the proximal housing and distal housing is transmitted to the rotary encoder.

24. The rotary encoder of claim 23, wherein an overall gear ratio of the gearbox is 1:1.

25. The endoscope of claim 17, further comprising an image sensor configured to provide an electronic image signal of a field of view of a distal end of the insertion shaft.

26. The endoscope of claim 25, further comprising a controller configured to receive the electronic image signal and the rotation signal, and to generate a display image for display on a display screen.

27. The endoscope of claim 26, wherein the controller controls a rotational orientation of the display image based on a value of the rotation signal.

28. The endoscope of claim 27, wherein the value of the rotation signal is proportional to the degree of relative rotation between the proximal housing and the distal housing.

29. An endoscope having a proximal handle assembly and a distal insertion shaft, the handle assembly comprising a proximal housing and a distal housing, the distal housing connected or attached to a proximal end of the insertion shaft, and rotatable relative to the proximal housing about a longitudinal axis of the proximal end of the insertion shaft;

a distal portion of the insertion shaft comprising a camera sensor configured to provide image data to a processor mounted on a printed circuit board enclosed in the handle assembly and attached or mounted to the distal housing;

wherein the distal housing comprises an image capture button configured to interact with the processor, allowing a user to record an image from the camera sensor while grasping the proximal housing.

30. The endoscope of claim 29, wherein the proximal housing encloses an electronic sensing apparatus that is mounted or attached to the distal housing.

31. The endoscope of claim 29, wherein the proximal handle assembly includes a rotation sensing apparatus configured to provide a rotation signal indicating a rotational position of the distal housing relative to the proximal housing.

32. The endoscope of claim 31, wherein the rotation sensing apparatus comprises a first potentiometer and a second potentiometer, the second potentiometer being rotationally offset from the first potentiometer.

33. The endoscope of claim 31, wherein the rotation sensing apparatus comprises a rotary encoder.

34. The endoscope of claim 33, wherein the rotary encoder comprises a potentiometer, magnetic rotary encoder or optical rotary encoder.

35. The endoscope of claim 33, wherein the rotary encoder comprises a potentiometer having a rotatable keyed shaft, such that the keyed shaft is stationary with respect to the proximal housing and the potentiometer is stationary with respect to the distal housing, or the keyed shaft is stationary with respect to the distal housing and the potentiometer is stationary with respect to the proximal housing.

36. The endoscope of claim 33, wherein the rotary encoder is transversely offset from the longitudinal axis of the insertion shaft.

37. The endoscope of claim 33, wherein the rotary encoder is coupled to a gearbox through which relative rotation of the proximal housing and distal housing is transmitted to the rotary encoder.

38. The rotary encoder of claim 37, wherein an overall gear ratio of the gearbox is 1:1.

39. The endoscope of claim 31, further comprising an image sensor configured to provide an electronic image signal of a field of view of a distal end of the insertion shaft.

40. The endoscope of claim 39, further comprising a controller configured to receive the electronic image signal and the rotation signal, and to generate a display image for display on a display screen.

41. The endoscope of claim 40, wherein the controller controls a rotational orientation of the display image based on a value of the rotation signal.

42. The endoscope of claim 41, wherein the value of the rotation signal is proportional to the degree of relative rotation between the proximal housing and the distal housing.

43. The endoscope of claim 1, wherein the processor is configured to receive input from an image capture button on the distal housing to allow the recording of a still image or a video of the image data received from the camera assembly.

44. The endoscope of claim 1, wherein the processor is configured to adjust the image data to correct the orientation of an image displayed on a display screen based on the rotation of the distal housing relative to the proximal housing.

45. The endoscope of claim 1, wherein the processor is configured to adjust the image data to correct for image distortions due to one or more lenses associated with the camera sensor.

46. The endoscope of claim 1, wherein the processor is configured to perform an exposure feedback analysis of the image data to adjust the light exposure of subsequent image data received by the processor.

47. The endoscope of claim 15, wherein the processor is configured to receive input from an image capture button on the distal housing to allow the recording of a still image or a video of the image data received from the camera assembly.

48. The endoscope of claim 15, wherein the processor is configured to adjust the image data to correct the orientation of an image displayed on a display screen based on the rotation of the distal housing relative to the proximal housing.

49. The endoscope of claim 15, wherein the processor is configured to adjust the image data to correct for image distortions due to one or more lenses associated with the camera sensor.

50. The endoscope of claim 15, wherein the processor is configured to perform an exposure feedback analysis of the image data to adjust the light exposure of subsequent image data received by the processor.

51. The endoscope of claim 29, wherein the image capture button is configured to cause the recording of a still image or a video image.

52. The endoscope of claim 29, wherein the processor is configured to adjust the image data to correct the orientation of an image displayed on a display screen based on the rotation of the distal housing relative to the proximal housing.

53. The endoscope of claim 29, wherein the processor is configured to adjust the image data to correct for image distortions due to one or more lenses associated with the camera sensor.

54. The endoscope of claim 29, wherein the processor is configured to perform an exposure feedback analysis of the image data to adjust the light exposure of subsequent image data received by the processor.