

CLAIMS:

What is claimed is:

1. A system for use with existing devices to provide monitoring of a change in state, the system comprising:

5 a) a camera;

b) a subsystem having a supervisory computer or control circuitry;

c) a communications component for communicating images obtained with the camera to the subsystem;

d) wherein the subsystem is configured to receive the communicated images and has
10 a processor and software containing instructions for storing the communicated images and for manipulating the images;

e) wherein the system manipulates the images by extracting and digitizing the images;

f) wherein the device is a motor, and wherein the camera captures images of the motor and processes the images to determine a condition of the motor operation;

15 g) wherein the condition of operation is motor vibration;.

h) wherein each of the images captured comprises a frame having a frame area, wherein said motor is imaged in said frame area, wherein said motor when operating is captured at different locations within the frame area; wherein said capture locations of the motor are evaluated to determine the motor operating condition;. And

20 i) wherein (i) an acceptable vibration state is defined by a vibration area of the image frame represented by a set of coordinates; or (ii) said frame area comprises coordinates defining locations within the frame, wherein said motor images are represented by coordinates, wherein said motor image coordinates determine a vibration state of the motor.

2. The system of claim 1, wherein extracting and digitizing of an image comprises

25 extracting and digitizing a selective portion of the image, wherein the image comprises a

panel representation, and wherein the selected portion of the image represents a location on the panel where a readable element is located.

3. The system of claim 2, wherein the readable element comprises a gauge, meter, switch, dial, light, or indicator.

5 4. The system of claim 1, wherein said camera and said communications component for communicating images are configured together and include one or more processing components with circuitry for processing the images from the camera.

5. The system of claim 4, including a frame timer for regulating the frequency of the image capture rate.

10 6. The system of claim 4, wherein said one or more processing components include at least one processor coupled with said circuitry to execute software containing instructions for regulating the capture of images to capture frames of the panel when a change in the panel being imaged occurs.

7. The system of claim 1 or 2, comprising a first subsystem and a second subsystem,
15 wherein the first subsystem includes the camera and communications component, and wherein the second subsystem comprises the subsystem having a supervisory computer or control circuitry.

8. The system of claim 7, wherein the first subsystem includes a change frame detection mechanism which processes the image data obtained with the camera, identifies when a
20 change in the device being monitored has occurred, and actuates the capture of image frames of the device being monitored when a change in the monitored device is detected.

9. The system of claim 8, wherein the device being monitored comprises a panel.

10. The system of claim 9, wherein the panel includes a monitored component, and wherein the change frame detection mechanism is configured to identify when a change to
25 the monitored component has occurred.

11. The system of claim 10, wherein the monitored component comprises a meter.
12. The system of claim 8, wherein a plurality of cameras are provided, and wherein the device being monitored includes a plurality of components to be respectively monitored by the respective plurality of cameras.
- 5 13. The system of claim 12, wherein the plurality of cameras are provided in a single housing.
14. The system of claim 7, wherein said first subsystem includes a frame timer for regulating the frequency of the image capture rate.
15. The system of claim 7, wherein said first subsystem is configured to capture
10 continuous video from the camera.
16. The system of claim 8 or 15 wherein said first subsystem is configured to process the image frame or video by compressing, formatting, encrypting, or one or more of these processes.
17. The system of claim 7, wherein the first subsystem includes a supervisory computer
15 or control circuitry that is coupled to receive image inputs from the camera, and wherein the first subsystem is configured to manipulate the camera images by:
- a) regulating the frequency of the image capture rate with a frame timer;
 - b) processing the image frame or video by one or more of compressing, formatting, or encrypting the image frame or video; and
 - 20 c) transmitting the processed image frame or video to the second subsystem.
18. The system of claim 17, wherein the first subsystem comprises a remote subsystem, and wherein the second subsystem receives processed image frames or video from the first subsystem, and wherein the second subsystem is configured to manipulate the processed image frames or video by:

a) processing the image frame or video by one or more of decompressing, formatting, or decrypting the image frames or video received from the first subsystem;

b) storing the image frames or video in a memory or storage component; and

c) generating a sequence of digital values for the extracted and digitized image.

5 19. The system of claim 18, wherein said device monitored comprises a panel having a plurality of readable elements thereon, wherein said readable elements include at least one first readable element and at least one second readable element; wherein extracting at least one portion of the image includes extracting from the image at least a first portion of the image that contains the image of the first readable element and extracting from the image at
10 least a second portion of the image that contains the image of the second readable element; wherein digitizing the extracted image portion to generate a sequence of digital values is done for each extracted image to generate a sequence of digital values for the first readable element, and a second sequence of digital values for the second readable element.

20. The system of claim 18, wherein the first subsystem comprises a first supervisory
15 computer or control circuitry, and wherein the second subsystem supervisory computer or control circuitry comprises a second supervisory computer or control circuitry.

21. The system of claim 7, wherein said first subsystem is provided as part of the camera.

22. The system of claim 7, wherein the first subsystem comprises a remote subsystem which is remote in proximity to said second subsystem.

20 23. The system of claim 1, wherein said image processing comprises processing an image of a device that is an analog component and displays an analog value thereon, and wherein digitization comprises generating a digital value for the analog value.

24. The system of claim 1, wherein the camera comprises an infrared-capable camera.

25. The system of claim 24, including an infrared illumination means.

26. The system of claim 1, wherein said communications component comprises a communications link.

27. The system of claim 26, wherein said communications component comprises a wireless cellular link.

5 28. The system of claim 26, wherein the communications link includes a cellular wireless portion.

29. The system of claim 26, wherein the communications link includes a satellite wireless portion.

30. The system of claim 1, including change detection means for detecting changes of the
10 image captured when the image captures something other than the meter within the image frame or designated portion of the image frame.

31. The system of claim 1, wherein the system is configured with software containing instructions for processing images received from the camera, and determining whether the image is an image panel or portion, or is something other than the image panel or portion.

15 32. The system of claim 1, including change detection means for detecting change, wherein change detection includes the entry of an object or hand into a view which triggers the sending of a frame or video.

33. The system of claim 32, wherein the camera and change detection system is used remotely to monitor the vibration of a motor or engine.

20 34. The system of claim 33, wherein the camera and change detection system is used to monitor the loading or torque on a motor or engine.

35. The system of claim 1, including sound detection means comprising a sensor for detecting an audible event.

36. The system of claim 35, comprising a first subsystem and a second subsystem,
25 wherein the first subsystem comprises a remote subsystem which is remote in proximity to

the second subsystem and includes the camera and communications component, wherein the second subsystem comprises a subsystem having a supervisory computer or control circuitry, and wherein detection of an audible event comprises ascertaining whether a buzzer, alarm, or audible warning, has been actuated within the proximity of the remote subsystem.

5 37. The system of claim 1, wherein the system generates an alert when the motor vibration determined by the camera images is not operating within the acceptable vibration state.

38. The system of claim 2, including a local control system that controls the camera based on a frame rate, a change in the panel itself, or a combination of these.

10 39. The system of claim 7, wherein said communications component comprises a communications link, and wherein the first subsystem receives command and control directives from a communications link.

40. The system of claim 9, wherein the panel includes the readable element, and wherein the system applies a sub mask to generate a sub-image of the readable element.

15 41. The system of claim 1, including a device library containing initial set up parameters for a plurality of devices to be digitized, wherein a device of the device library may be selected to apply settings that direct the camera and image processing operations.