

the most part, the individual simply dons their items of apparel in a substantially ordinary fashion and nevertheless receives the benefits of such sensing, monitoring, and processing.

Referring now to FIG. 5, as noted earlier, these embodiments provide for the reading 50 of sensor data from a plurality of sensors and particularly from a plurality of sensors that sense, in alternative ways, one or more parameters that correspond to various physical states of interest. In one embodiment, these sensor readings can be evaluated to ascertain a likely reading of the physical state and then compare that reading against a threshold to determine 51 whether the individual being monitored faces a potentially dangerous circumstance. For example, if an individual's pulse rate is presently exceeding a dangerous threshold, that circumstance can lead to a determination that the individual faces heightened risk (i.e., in this case, of suffering a heart attack or other related circulation anomaly). Upon determining that such a risk exists, if desired and presuming the availability of a local display, information regarding the parameter in question and/or a warning statement can be provided 52 (either with or without an audible alarm sound to alert the individual to consult the display and take appropriate action). Also depending upon the physical embodiment, if a wireless transmission mechanism is available, the raw sensor readings and/or parameter readings based upon the sensor readings and/or warnings information can be transmitted to a location remote from the user to facilitate remote monitoring and/or decision making.

As noted above, in some embodiments the individual wearing the sensors may not have local sensor data evaluation processing capability on-board. As also noted above, in such a case, the sensor data can be transmitted to a remote location where resources are available to support such evaluation. In such a case, and referring now to FIG. 6, when the local wireless unit receives 60 a message, the receiving unit case ascertain 61 whether an alarm condition exists. When true, a local alarm 63 can be provided followed by whatever additional processing 62 is appropriate to the given application. Also, as noted above with respect to FIG. 5, the received message can also contain specific instructions intended for the person wearing the items of apparel. In such a case, in addition to sounding the alarm, such instructions can be presented to the individual using a display, speaker, or other transducer as is appropriate to the form of the message.

Referring now to FIG. 7, it should be clear that an individual, such as a fire fighter, can position a plurality of sensors about their body by simply donning items of apparel that have the sensors pre-positioned therein. For example, a first sensor 70 could be positioned in a helmet, a second sensor 71 could be positioned in the armpit of a coat, a third sensor 72 could be positioned over the chest in the coat, a fourth sensor 73 could be positioned in a boot, and a fourth sensor 74 could be positioned in a glove. Information from these sensors could then be processed in a handheld two-way radio 75 that includes an appropriate transceiver (such as a personal area network transceiver) where the resultant parameters are then evaluated and risks of various kinds assessed. Corresponding information could then be transmitted by the two-way radio 75 (using, for example, ordinary transmission frequencies, signaling protocols, and modulation) to another radio unit 76 (such as might be mounted in a nearby vehicle or as provided in a distant communications facility such as a public safety dispatch communications center). The latter could, if desired, then be coupled to a network 77 such as, for example, a local area

network or the Internet such that the information would be more widely available.

So configured, processing of the sensor data, evaluation thereof, issuance of threat warnings, and monitoring of any of the above can be distributed as is desired and convenient and as might be appropriate to a given application. For example, any of these processing steps could occur at one of the sensor locations, at a stand-alone processing and evaluation unit located elsewhere in the items of apparel, at the two-way radio, at a remote radio site, or at any other site having access via the network.

Those skilled in the art will recognize that a wide variety of modifications, alterations, and combinations can be made with respect to the above described embodiments without departing from the spirit and scope of the invention, and that such modifications, alterations, and combinations are to be viewed as being within the ambit of the inventive concept.

We claim:

1. An apparatus comprising:

at least one item of apparel;

a plurality of sensors disposed within the at least one item of apparel, wherein at least two of the plurality of sensors each sense, in alternative ways, a same parameter that corresponds to a given physical state.

2. The apparatus of claim 1 wherein the at least two of the plurality of sensors are disposed within one of the at least one item of apparel.

3. The apparatus of claim 1 wherein the at least one item of apparel comprises at least one of headgear, a torso covering, a glove, footwear, pants, a dress, an apron, a belt, suspenders, and an undergarment.

4. The apparatus of claim 1 wherein at least one of the plurality of sensors is readily removable from the at least one item of apparel such that the at least one item of apparel can be laundered without the at least one of the plurality of sensors.

5. The apparatus of claim 1 wherein the given physical state comprises at least one of human blood pressure, pulse rate, temperature, respiration rate, blood oxygen, movement, and vertical bearing.

6. The apparatus of claim 1 wherein the given physical state comprises at least one of environmental temperature and environmental content.

7. The apparatus of claim 6 wherein the environmental content includes at least one of carbon monoxide, carbon dioxide, toxic gases, explosive gases, and biohazards.

8. The apparatus of claim 1 wherein at least some of the plurality of sensors sense information as a function of at least one of sound, ultrasonic sound, voltage potential, infrared, ultraviolet, temperature, and pressure, radar, electromagnetism, and laser light.

9. The apparatus of claim 1 and further comprising a radio transmitter operably coupled to at least some of the plurality of sensors, wherein the radio transmitter is disposed within the at least one item of apparel.

10. The apparatus of claim 1 and further comprising a user interface having at least one of a display and an audible alarm operably coupled to at least one of the plurality of sensors, wherein the user interface is supported by the at least one item of apparel.

11. The apparatus of claim 1 and further comprising a processing unit that is operably coupled to the at least two of the plurality of sensors and wherein the processing unit is disposed within the at least one item of apparel.

12. The apparatus of claim 11 wherein the processing unit is operably coupled via a physical link to at least one of the at least two of the plurality of sensors.