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Application Number	TO BE ASSIGNED
Filing Date	March 19, 2008
First Named Inventor	Randall J. Amerson
Attorney Docket Number	2008P05081 US
Title (Required)	Methods To Manage Power Of Wireless Multi-sensor Device

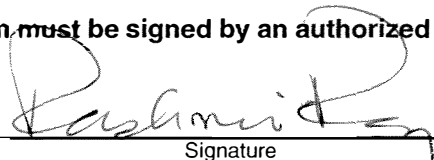
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March 19, 2008

Date

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Title

50,500

Registration Number, if applicable

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A. Abstract

Our proposed invention relates to several methods to manage the battery power needed to send sensed values from a battery-powered multi-sensor wireless device. The goal is to extend battery life.

In a typical multi-sensor wireless device, the device always sends all of the sensed values to the receiving device (i.e., field panel controller, application specific controller) regardless of whether or not all of the values are currently being used by the control application that resides in the receiving device. The disclosed method #1 and #2 propose that the receiving controller communicate to the wireless multi-sensor information about which sensed values are currently being used by the controller's software. With this information, the wireless multi-sensor can limit its battery-draining radio transmissions to only those containing the sensed values currently needed.

Method #3 proposes a method by which the receiving device can command the multi-sensor wireless device to the ON state, when it should transmit sensor values, or to the OFF state, when it should not transmit sensor values and save battery power.

B. Background Information

The battery-powered multi-wireless sensor device is composed of:

- multiple sensors (temperature, humidity, carbon dioxide, volatile organic compounds)
- microprocessor
- signal processing hardware and software
- radio transmitter and receiver hardware and software
- battery

A long life for the battery that powers the wireless multi-sensor is a desirable product feature. The part of the wireless multi-sensor that consumes the most power is the radio transmitter when it is transmitting a signal. Significant power draw can also come from some sensors (such as the CO2 sensor) that need to be pre-heated to get an accurate measurement.

Traditionally, a wireless multi-sensor updates the values of all of its sensors every predefined number of milliseconds. Sensors that need to be pre-heated to get an accurate measurement (such as CO2 sensors) have their circuitry energized at intervals determined by the heating time requirements. The wireless multi-sensor transmits a signal containing the values of all of its sensors in the one message. Transmission occurs whenever any of the sensors' values exceed their respective change-of-value (COV) threshold value. The receiving device (field panel controller or application specific controller) accepts all of the sensor values from the wireless multi-sensor. The application software in the receiving device (controller) may be such that only one sensed value at a time is actually controlling the output device. The other sensor values are ignored. An example is a cooling device capable of both cooling and dehumidifying the air. If the sensed humidity is very high, the cooling device will be controlled by the humidity sensor. Changes in the air temperature will have no effect on the cooling device. Therefore, the battery power to transmit air temperature values from a wireless multi-sensor device is wasted.

C. Details

1. Method #1 to disclose consists of a multi-sensor wireless device that:

- a. that continually senses the values of all of its sensors every predefined number of milliseconds
- b. compares each sensed value against each sensor's respective change-of-value (COV) threshold value
- c. receives information from the receiving device regarding which sensor is currently in control
- d. then only transmits changes of the sensed value(s) that are in control as refer to the above
- e. regardless of sensed value in control, still transmits all of its sensor values at a specified interval to indicate that its sensors are still operating and to provide the sensed values not in control to the receiving device so that it may make necessary switchover decisions concerning which sensor should be in control.

By sending only the sensed value that is in control, the following advantages are realized:

- conservation of the battery usage to energize the radio transmitter and send a sensor value, thus extending the life of the battery.
- reduction of message size that needs to be transmitted by the wireless network, because the wireless message will only contain the sensed value that is in control.
- network throughput can be especially increased if the wireless messages, which are reduced in size by this invention, have encryption or additional error-checking.
- Additional battery power can be conserved by not unnecessarily energizing those sensing elements that require heating or some other significant power draw.

2. Method #2 to disclose is a multi-sensor wireless device that:

- a. same as #1a above
- b. same as #1b above
- c. receives data from the receiving controller that can be processed by the multi-sensor wireless device's own processor in order to determine which sensed value is in control
- d. same as #1d above
- e. same as #1e above

3. Method #3 to disclose is a multi-sensor wireless device that receives an ON/OFF signal from the receiving device. Upon receiving an ON signal, the multi-sensor wireless device will implement a transmission method that may be method #1 or #2 above or some other method. Upon receiving an OFF signal, the multi-sensor wireless device will go into a "sleep" mode during which it will not transmit sensor value signals. It may or may not transmit short "I'm OK" signals during this "sleep" mode. By limiting its transmissions while in the "sleep mode," battery power is conserved.

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	METHODS TO MANAGE POWER OF WIRELESS MULTI-SENSOR DEVICE			
First Named Inventor/Applicant Name:	Pornsak Songakul			
Filer:	Rashmi S. Raj/Ruth Rocky			
Attorney Docket Number:	2008P05081US			
Filed as Large Entity				
Provisional Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Provisional application filing	1005	1	210	210
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
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Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
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