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(54) **UNIVERSAL PERSONAL EMERGENCY  
INFORMATION NOTIFICATION AND  
REPORTING SYSTEM AND METHOD**

(52) **U.S. Cl.**  
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(57) **ABSTRACT**

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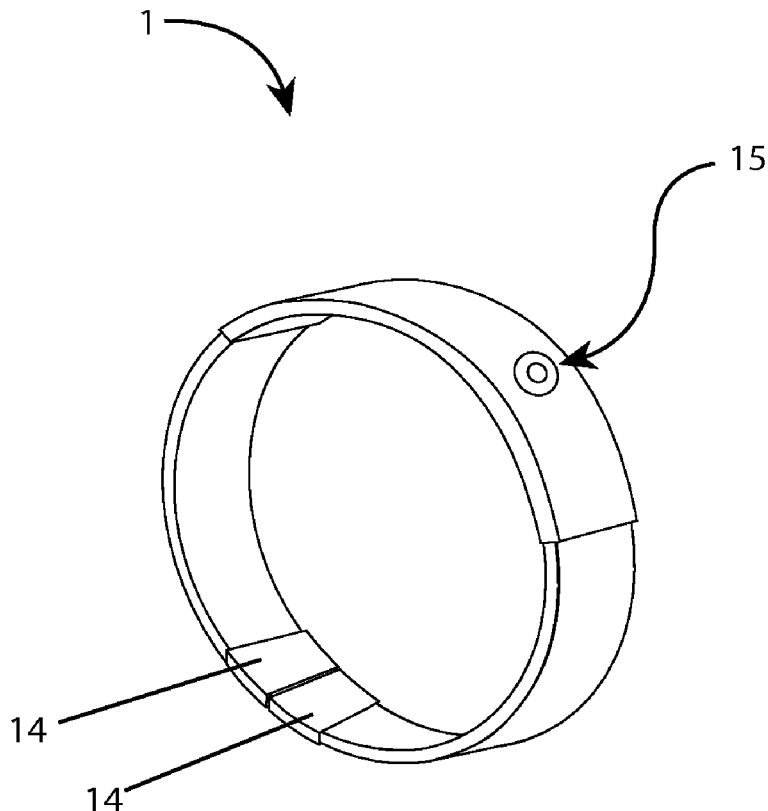
An emergency power supply system for providing hydraulic power and electric power in an aircraft includes a fuel cell having an electric outlet for providing electric power, a conversion unit couplable with at least one of an AC bus and a DC bus and the electric outlet, and at least one hydraulic pump having a reconfigurable electric motor and a motor control unit and being couplable with a hydraulic system for providing hydraulic power. The conversion unit is adapted for converting a supply voltage of the electrical outlet to at least one of an AC voltage matching a predetermined voltage at the AC bus and a DC voltage matching a predetermined voltage at the DC bus. The reconfigurable electric motor is couplable with the fuel cell and the AC bus and is adapted for being operated by the supply of electric power either from the fuel cell or the AC bus.

**Related U.S. Application Data**

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(51) **Int. Cl.**  
**G08B 25/01** (2006.01)  
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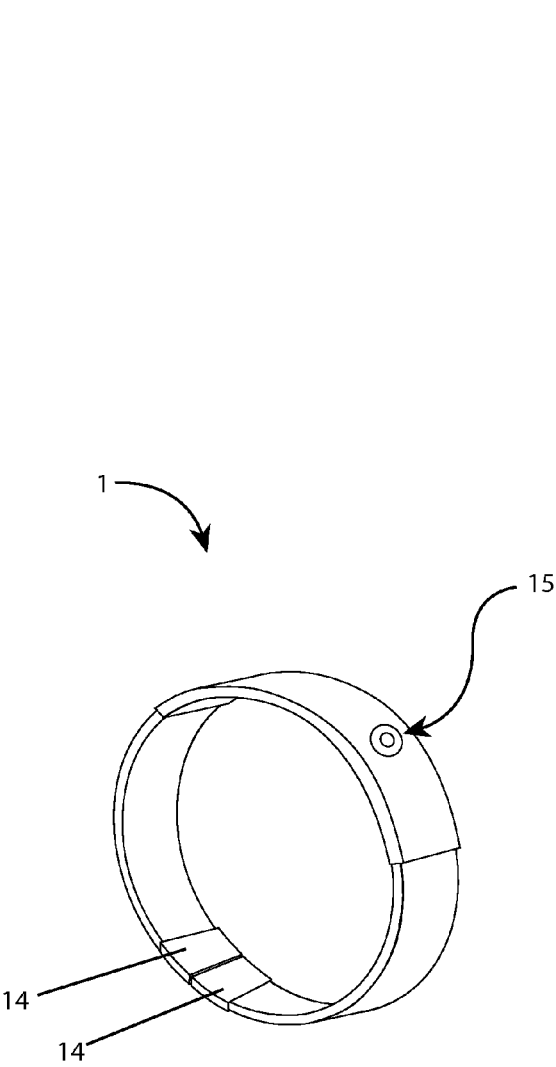


FIG. 1A

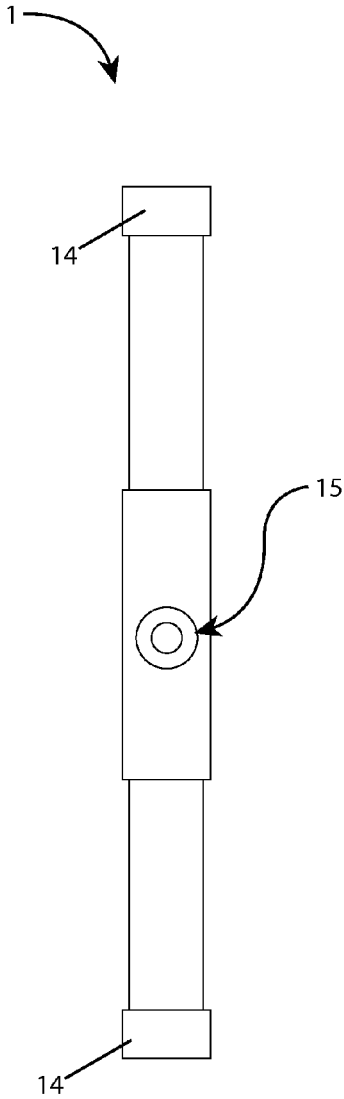


FIG. 1B

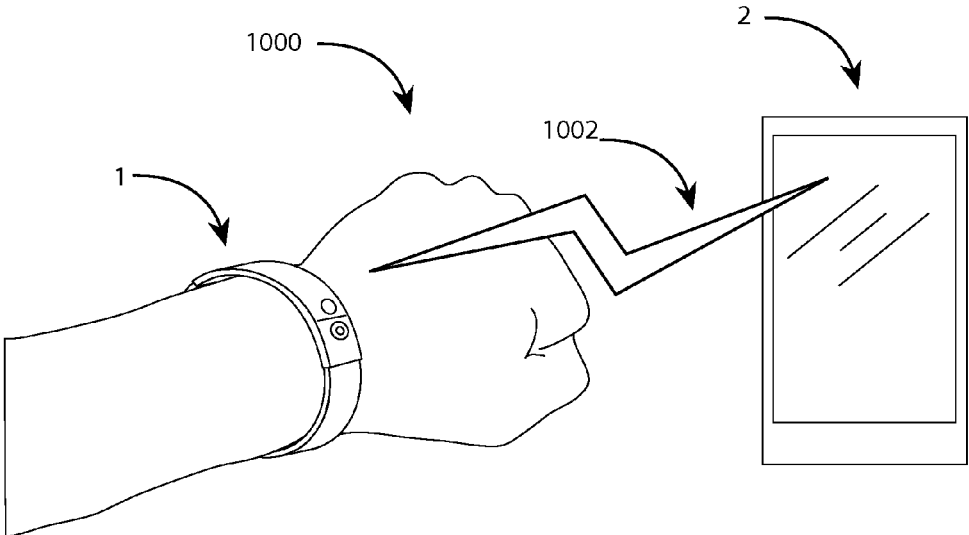


FIG. 2

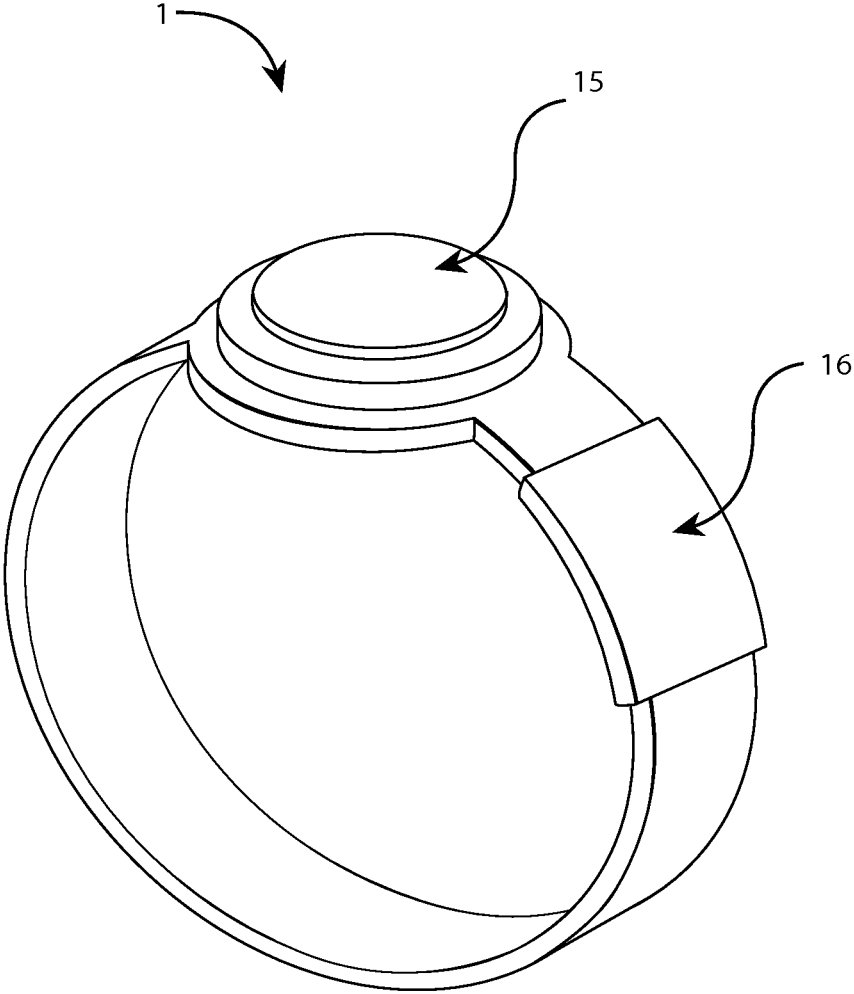


FIG. 3

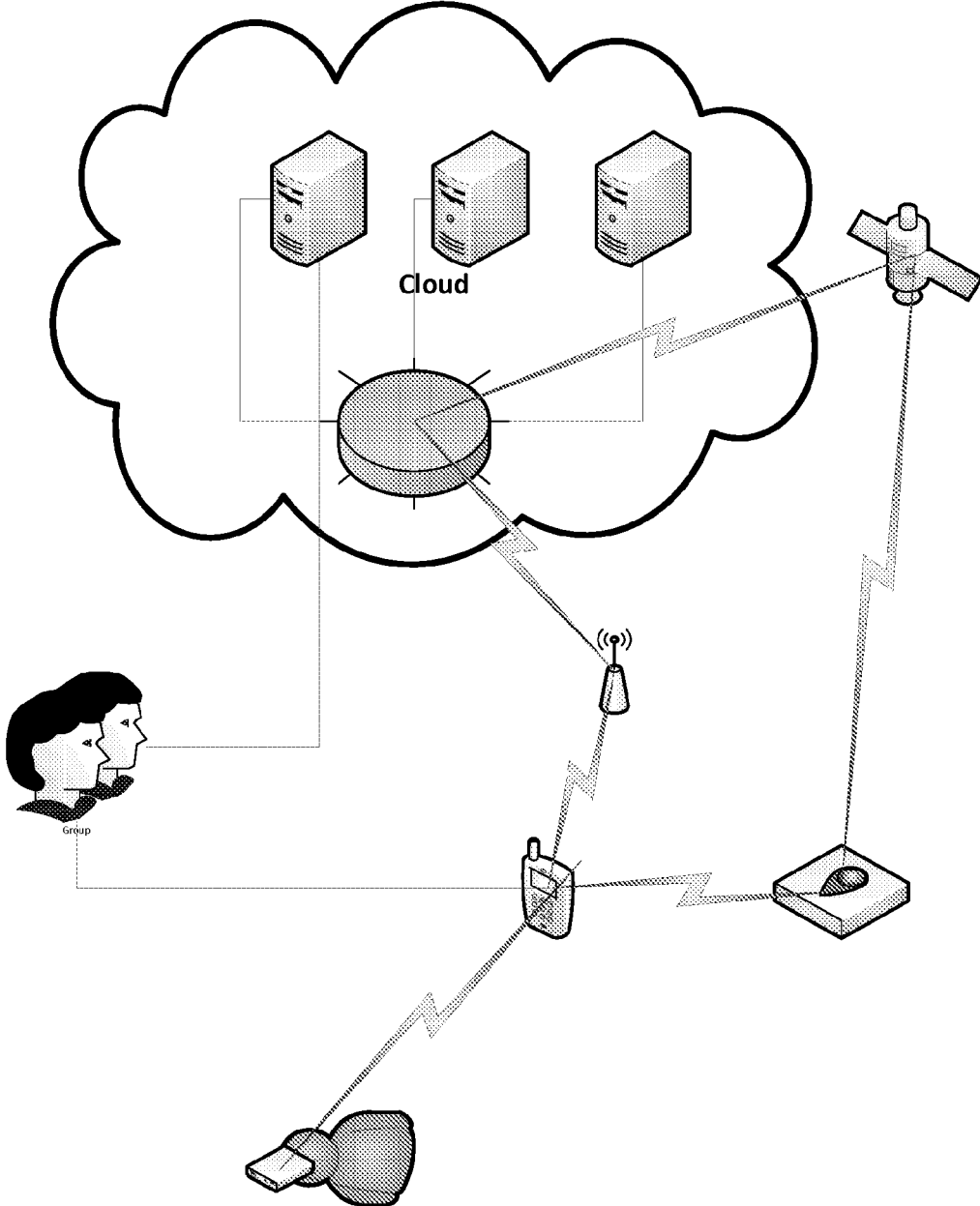


FIG. 4

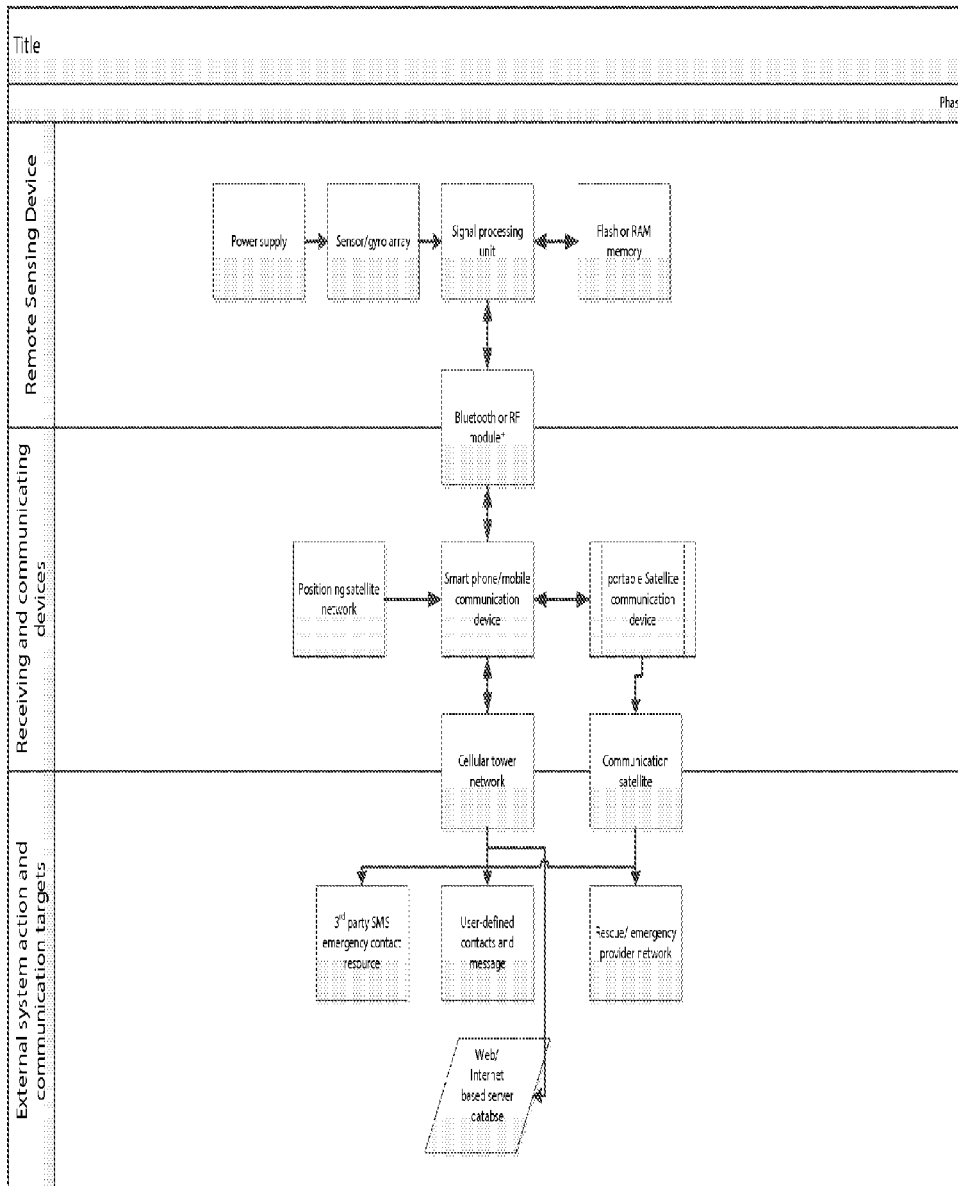


FIG. 5A

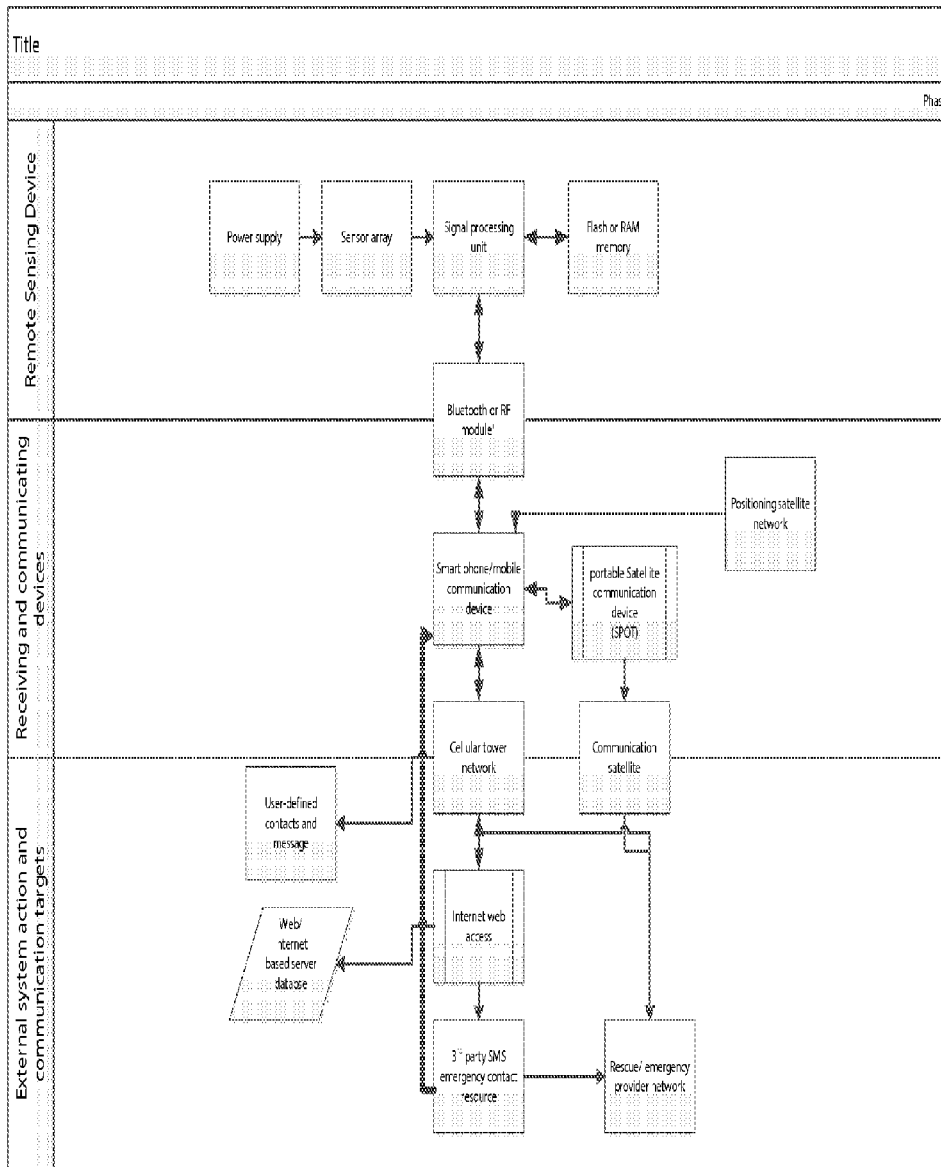


FIG. 5B

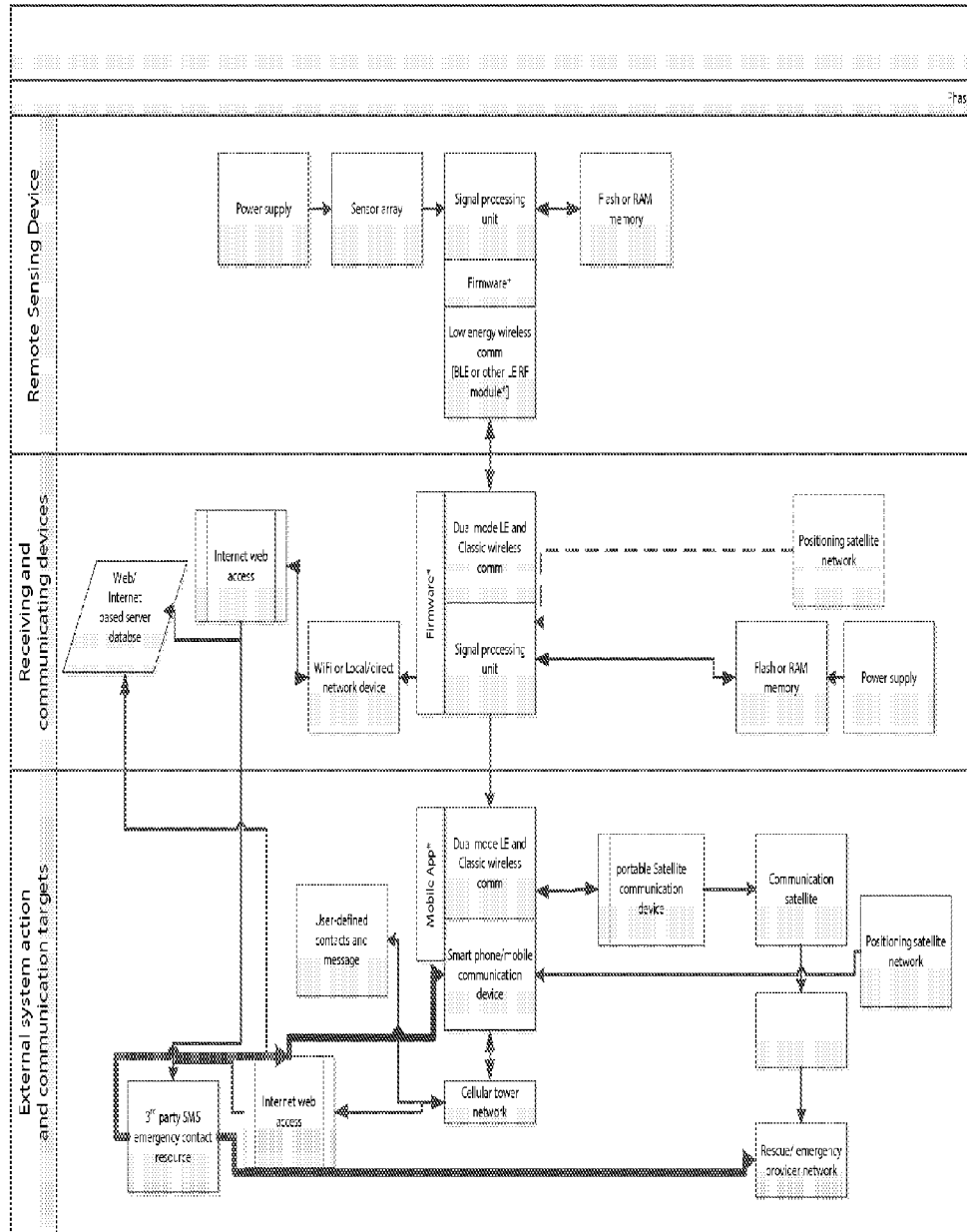


FIG. 5C



## UNIVERSAL PERSONAL EMERGENCY INFORMATION NOTIFICATION AND REPORTING SYSTEM AND METHOD

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable.

### STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

[0002] Not Applicable.

### REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISK APPENDIX

[0003] Not Applicable

### FIELD OF THE INVENTION

[0004] The invention relates to wearable wireless communication devices and methods of utilizing such devices.

### BACKGROUND OF THE INVENTION

[0005] Every day millions of people engage in activities where their bodies are exposed to risks of varying intensity and cause, either external or due to underlying medical conditions. These risks may limit one's ability or desire to perform tasks such as those related to common everyday living, occupational functions or for the purposes of recreation.

[0006] It is generally recognized that in cases of a medical emergency those with an underlying medical conditions often wear or carry medical identification jewelry or information cards to facilitate medical care in the case of medical emergency or other events. Such devices are useful for the purposes of providing valuable information about the wearer in case of an event that would require medical attention. However such solutions are merely an informational queue for persons attempting to assist the wearer such as a first-responder, emergency medical technician, paramedic or simply a member of the general public acting in the capacity of a Good Samaritan. Furthermore, the amount of information such devices may hold, often in a non-digital, human-observable form, is limited by the small form-factor.

[0007] Other devices available in the prior art surrounding the addressing of medical response needs are available in the form of a help-call button mounted at strategic points within a facility or home. Alternatively, such devices may be worn and activated by the user or other persons assisting the wearer in order to summon emergency medical service personnel. The problem with such solutions stem from the need for activation that may occur following an event which prevents the user from being able to perform such actions. Furthermore, although previous medical information may be available, actionable data pertaining to the current event is unavailable to provide summoned medical personnel. Further still, such permit little mobility in the sense that the help-call buttons are typically hard wired or, in the case of the user-worn variety, offer a limited range of communication.

[0008] There are several commercially available medical data storage applications that are configured as jewelry or clothing elements and allow a wearer or emergency respond-

ers to access medical records stored within said applications. Additionally, there are several applications configured to allow a wearer to signal the emergency responders and summon assistance. However, there is a lack of a practical application configured with sensors and reporting means to alert the wearer or the emergency responders of a sensor-detected condition exceeding a predetermined threshold and predicted to present a medically urgent condition, and further configured to communicate the wearer data and information to the emergency responders.

[0009] Other devices in the prior art surrounding the need for notification to family members, caretakers, and other intended recipients in the case of need for assistance such as in an emergency revolve permit a nearly unlimited range by providing communication to a centralized service by means of satellite communication. These devices, however, provide a user a limited selection of communication options stemming from a series of pre-written messages by the user to be sent when the user actuates one of a series of buttons. Furthermore, some devices known in the prior art also require a substantially clear view of the sky, limiting the application of such a device to outdoors and away from large structures.

### DESCRIPTION OF FIGURES

[0010] FIG. 1A. Preferred embodiment of the Identification Device

[0011] FIG. 1B. Preferred embodiment of the open Identification Device

[0012] FIG. 2. Identification Device embodiment on wrist

[0013] FIG. 3 Identification Device alternative embodiment

[0014] FIG. 4 Diagram of Embodiment of Communication System Related to Wearable Device

[0015] FIG. 5A Flowchart of Communicative Steps Taken in Association with Storage of and Access to Data in Embodiment of System

[0016] FIG. 5B Flowchart of Communicative Steps Taken in Association with Delivery of Notification to Third Party in Embodiment of System

[0017] FIG. 5C Flowchart of Communicative Steps Taken in Association with Delivery of Geolocation Information to Third Party in Embodiment of System

### NUMERICAL REFERENCES IN FIGURES

[0018] 1. Identification Device ("ID") embodiment

[0019] 2. Long-Range Communications ("LRC") device or cellular phone embodiment.

[0020] 3. Remote Information and Communications Center embodiment

[0021] 4. Emergency Medical Service ("EMR")

[0022] 11. RF Transmitter

[0023] 12. Networked Data Center embodiment

[0024] 13. Mobile Software Application embodiment

[0025] 14. Clasp Embodiment

[0026] 15. Button Embodiment

[0027] 16. ID tag Embodiment

### SUMMARY OF THE INVENTION

[0028] The preferred embodiment of the invention comprises an apparatus and preferred method of using said apparatus to create a portable diagnostic reporting system configured with data storage, sensors, processing, and trans-

mission means to notify intended recipients of collected and prewritten user data. Generally, the preferred embodiment of the invention comprises a system and method implemented in situations where an individual or a plurality of users of an identification and data storage device discussed herein, recognize the value of the transmission of prerecorded information or collected data to recipients.

**[0029]** The preferred embodiment of the invention is intended as an identification device providing a means to store and record user data, detection of a physiological event, means to alert the user of event occurrence, and a means of communication of the event occurrence and wearer's data to a communication device, such as a mobile telephone, to enable communication of collected and stored data to intended recipients.

**[0030]** Furthermore, embodiments of the invention are configured to employ direct-to-mobile communications devices to report the user's data and more specifically to store and transmit the data and alert local area recipients/responders of useful personal information or access to important health or contact information in the case of an emergency, or in the case of, for example, other adverse biometric, climatic, atmospheric or battlefield conditions as intended by the user.

#### DETAILED DESCRIPTION OF THE INVENTION

##### DEFINITIONS

**[0031]** MEMS—micro-electric mechanical system.

**[0032]** EEPROM—electrically erasable programmable read-only memory.

**[0033]** BLE—Bluetooth Low Energy

**[0034]** BLEC—Bluetooth Low Energy to Classic Converter

**[0035]** RF—radiofrequency

**[0036]** Cloud Computing—using multiple server computers via a digital network, as though they were one computer.

**[0037]** A device embodying the inventive principles of the invention comprises a power supply, at least one sensor, a processing unit, memory storage and communication means, solves the problems surrounding providing actionable data to intended recipients who intend to provide assistance to the user of said device. Said device records at least information set relevant to the user and saves it to memory storage. Sets of information include but are not limited to user's physiological and environmental information such as body temperature, heart rate, blood pressure, and perspiration. Enabled by the processing unit, at a predetermined event indicated directly by said information sets or the analysis thereof, the device utilizes the communication means to contact a remote recipient. Said recipient or plurality thereof, includes but is not limited to emergency medical service providers, family members, medical care providers, co-workers or anybody present to provide assistance to the user as necessary. Furthermore, the user may initiate the communication of said information sets manually if it is so desired. Further still, the device may be configured to allow the constant streaming of information sets or permit the request for data by a pre-approved entity such as a user's primary care physician.

**[0038]** The preferred embodiment of the invention comprises an identification device 1 ("ID"), configured as a

wearable article such as a piece of jewelry (bracelet, anklet, necklace) or article of clothing, worn by a wearer. Said ID 1 comprises of a power source, a control means, a micro-processor, memory storage, one or more sensing modules, and a means for short-range communication, herein referred to as an SRC, a transceiver, and an interface means. Furthermore, ID 1 is communicatively configured via the SRC with a Long Range Communication device herein referred to as an LRC. An LRC may comprise of a communication device with internet, cellular, or satellite communication connectivity capable of receiving and transmitting information through long range communication protocols including but not limited to cellular network, internet protocol, satellite communications and radio.

**[0039]** In an embodiment of the invention, the ID comprises of a wrist worn device with a sensor array, power supply, signal processing unit, memory and an SRC module. It will be appreciated by one skilled in the art that power supply refers to a source of electrical power, such as a battery or a capacitor. Said power source configuration allows the embodiment to be replaced or recharged as necessary. The preferred embodiment of the wrist worn device further comprises a clasp mechanism 14 to accomplish fastening to the wearer's wrist or other clothing or accessories worn by the wearer.

**[0040]** LRC is configured as a communication device operating with a mobile software application 13 to process signal communications from the ID, and capable of receiving and/or transmitting RF and other wireless communications (E.g. WiFi, Bluetooth®, Bluetooth Low Energy® or other Low Energy technology transmitter such as ANT+® or Zigbee®) in the frequency range of the means for short-range wireless communication 105, and capable of wired or wireless long-range communications in a manner that allows for communicating with emergency responders or computer networks. The LRC within this embodiment comprises of one of a number of devices including but not limited to a Bluetooth enabled cellular telephone or a portable satellite telephone, capable of data transmission to emergency responders.

**[0041]** In such embodiment as described in the preceding paragraph, the ID is paired with a specific LRC device, preferably the cellular telephone of the user, user's spouse or a parent if the user of the ID is a child. In an embodiment of the invention, the pairing of the ID to an LRC is enables such that if it is desired, the users may pair a plurality of ID devices to a singular phone, a singular ID to a plurality of phones or a plurality of ID devices to a plurality of LRCs. When communication is initiated, the ID transmits the information to an LRC which is then transmitted to an external system. The external systems include but are not limited remote information and communications centers, 3<sup>rd</sup> party EMS services, medical care providers such as a primary care physician and rescue workers.

**[0042]** Said remote information and communications center 3, Cloud, comprises of a networked data center capable of receiving communications from the LRC means 12 and processing the data to determine the nature of the event occurrence. Furthermore, the LRC is capable of data storage, including wearer's medical records and personal information, and based on the data contained in the event occurrence communication configured to select optimal EMS 4. Said optimal EMS being one that is geographically located close

to the wearer **1000** and capable of responding to the specific type of event occurrence as detected by the sensor means **104**.

**[0043]** The preferred embodiment of the device incorporates a button **15**. The button is designed for easy access by the wearer or a third party that comes upon the wearer. Upon pressing the button, the communicative processes described further in the flowcharts included herein as FIG. **5A**, FIG. **5B**, and FIG. **5C** are initiated. A primary purpose of the button is to provide a one step process, namely pressing the button, to initiate processes to deliver important data associated with the wearer to concerned parties, including family, friends and emergency responders. In an embodiment of the invention, an ID tag **16** is incorporated within the design. The ID tag **16** in varying embodiments incorporates personal data about the user, including “Protected Health Information” as that term is described in the Health Insurance Portability and Accountability Act. In an embodiment, the ID tag **16** is programmable and exchangeable, so that the ID tag **16** may be replaced or reprogrammed with more updated information, to ensure that the information contained within and on the ID tag **16** about the wearer remains up to date. The ID tag **16** may also include human-readable information about the wearer on the exterior casing.

**[0044]** In one embodiment, the ID paired with an LRC **12** such as a mobile cellular device, is capable of employing the mobile software application **13** in conjunction with mapping and geopositioning mobile software applications, such as those produced by Google, to select an optimal EMS and transmit the wearer’s data along with the event occurrence data directly to the selected EMS.

**[0045]** The memory storage means of the ID **1** being operationally connected to a signal processing unit for receiving, storing, and transmitting (1) data relevant to the wearer, including but not limited to gender, height, weight, age, medical records and other “Personal Health Information” as that term is defined in the Health Insurance Portability and Accountability Act, (2) sensor data from sensor module, and (3) communication data relating to transmissions and receptions from the LRC.

**[0046]** An embodiment of the invention features sensing modules being configured to be external to the ID **1**, where the external configuration features a wearable sensing module communicatively connected to the ID **1**. Said connection being a direct contact (wired) or a wireless connection allowing the sensing module is a removable plug-in attachment, attachable to the ID **1**, enabling the wearer to attach different types of sensors to the ID **1** depending on the risks associated with the intended activity.

**[0047]** The sensing module further comprises one sensor or a plurality of sensors, preferably a two- or three-axis accelerometer configured to detect linear accelerations, motion, position, and impacts sustained by the wearer. Alternatively, the sensor array may further include but is not limited to the following sensors or a combination thereof; MEMS or piezoelectric accelerometers, force or strain gauges or transducers, force sensing textiles, thermocouples, thermistors, pyrometers, electric potential sensors, microphones, silicon piezoresistive pressure sensor, sensors for climatic data, biometric data, and the presence or chemical particle levels of nerve agents, poisonous gasses, bioweapons, oxygen, and a means for detecting and measuring sonic, percussive and or concussive results of explosions.

**[0048]** Additionally, the sensing module comprises a signal processor or a multiplicity of signal processors interfaced with the sensing elements of the sensing module. Generally, the signal processor, preferably integrated into the ID processing logic, is configured for any number of functions including filtering low frequency signals and analog to digital or digital to analog signal conversion where appropriate.

**[0049]** In an embodiment of the invention, the ID **1**, in combination with the sensing module further comprises a central processing unit, data memory buffer, data logger, fixed or removable flash memory unit, configured to receive, process, and record both signals and processed data from sensing module, process said data to determine if a triggering event occurrence has taken place, and if it has, commence an alarm sequence, said alarm sequence being configured to produce audible, visual, and/or tactile alarm utilizing control and interface means of the ID **1**, where the wearer would be alerted to the event occurrence by sounding of an alarm, flashing of lights, or the vibration of the ID. Should the wearer fail to cancel the alarm within a predetermined amount of time (in the preferred embodiment, 10 seconds, though the time period may vary in other embodiments), ID **1** would employ the SRC means to transmit the alarm to the LRC means, which would utilize a mobile software application to employ the audible, visual, and/or tactile means of the LRC to alert the wearer to the alarm, and present the wearer with the option of canceling the alarm via the LRC interface means—having the LRC transmit a “cancel alarm” signal to the ID **1**.

**[0050]** If the wearer does not cancel the alarm within an additional predetermined period (in the preferred embodiment, 20 seconds, though the time period may vary in other embodiments) utilizing either the ID or the LRC, the ID will transmit a second signal to the LRC, including such information as the wearer’s personal information and encrypted medical records data. The LRC will then transmit said signal to either EMS or a Cloud service configured to process said data, determine the type of event occurrence and determine the most appropriate deployment of EMS responders based on the location of the wearer and the event type.

**[0051]** In an embodiment, the ID may be configured to periodically repeat data transmissions until the confirmation of receipt and or user acknowledgment is received from the LRC upon the expiration of a preset maximum alert time or transmittal attempts, or predetermined time for wearer acknowledgment. The ID is configured to attempt transmitting un-encrypted version of the data to any other LRC equipped with software and processing logic to receive data signals emitted from the ID, where such secondary LRC devices would both alert their users of the event occurrence and automatically pass the alert to the emergency responders, effectively commandeering the secondary LRC to transmit an emergency alarm to the emergency responders. Optionally, the Cloud would store either a duplicate or additional records corresponding to a wearer, providing backup storage and having ability to ensure that the files transmitted to the EMS are not incomplete due to some error in the operation of the ID. In this embodiment, the ID would periodically employ the LRC to synch the files stored on the ID with the files stored on the Cloud service.

**[0052]** In an embodiment, the ID is configured to receive a data transmission prompt from the LRC device via the RF receiver. Such a prompt would be transmitted from a paired

LRC device, conveying predetermined user confirmation and authorization for the ID to transmit data stored on the removable storage memory to the prompting LRC device via the RF transmitter.

**[0053]** An embodiment features a means for determining the geographic position of the wearer and the ID via either a geospatial detector as a part of the sensing module **104**, or by employing a geospatial means integral to the LRC **2**, where the ID communicatively paired with a RF capable global positioning system (“GPS”), periodically updates the wearer’s data with the location and the time of the update by sending an inquiry to the GPS device and receiving the location data. Alternatively, the LRC **2** is configured with a software application that attaches the geospatial data from a LRC integral GPS to any message sent to EMS.

**[0054]** In an embodiment, the ID **1** additionally comprises a RF transmitter, or transceiver communicatively interfaced with the processing unit, data memory buffer, data logger, and the flash memory unit to allow for transmission of the stored wearer’s data and the collected event occurrence data to a receiving device, a long-range communications device **2**. Furthermore, said RF transceiver allows the receipt of commands, requests for data transmission, and confirmation signals from the LRC device **2** for the data transmission from ID’s SRC means to the long-range communications means LRC **2**. Said SRC and LRC **2** means may be employed to upload wearer’s data or files to ID **1** or to access and download said data to the computing device comprising the LRC **2**.

**[0055]** In an embodiment, the ID **1** is configured with software and processing logic configured to (1) utilize the RF transceiver to transmit data relating to event occurrence; (2) utilize the RF transceiver to confirm the receipt of said transmission by the long-range communications device **105** or periodically resend the data either until confirmation is received or for a preset period of time; (3) if there is no confirmation within the preset period of time, re-encode the transmission of the event occurrence for an immediate alert to emergency responders and attempt a transmission to any long-range communications device in the vicinity of the ID and capable of relying the data to the emergency responders; and (4) utilize the RF transceiver to accept prompts to transmit any data stored within the ID **1** via the RF transmitter and make said data available for access.

**[0056]** In an embodiment, the LRC **2** is configured to receive transmissions in the frequency range of the said RF transmitter **11**, and being configured with software and processing logic configured to receive and store the collected event occurrence data and employ any of the LRC user interface functionalities including audible, visual, or tactile to alert the user of an impact that exceeds a preset acceleration threshold.

**[0057]** In an embodiment, the LRC **2** is configured with software and processing logic to require user input to acknowledge the receipt of the said alert/alarm (optionally trigger a means to summon EMS); and further being configured with software and processing logic to alert emergency responders and summon assistance if the user fails to acknowledge the receipt of the said alert.

**[0058]** In an embodiment, the LRC **2** is configured with software and processing logic to allow the user review of stored impact data utilizing said user interface functionalities, specifically visual display capabilities and designate any of the data for transmission or download to a remote

computer or network storage device. Such configuration enables the user to transmit data via the LRC to a cloud computer server where the data is analyzed with predetermined algorithms and analytics to provide relevant, actionable and decision supporting data in form easily viewed by the user or other involved personnel interacting with the user. Such generated information from raw data streams from information sets may be viewed with a computing device, smart phone or even via the ID in simplified yet informative form.

**[0059]** An embodiment is configured with a means for programming, storing, and transmittal/reporting of (emergency) information of a person or object **1000**. A wearable ID **1** is configured for detection of an event or a physical triggering event (e.g. wearer appropriate button on the ID) and locally signaling an alarm to the wearer’s LRC such as a cellular phone **2** (or nearby cell phone) via the SRC module **105**. If the wearer **1000** fails to respond to the alarm via a control and interface means such as the LRC or appropriate button on the ID to either cancel the alarm or request the transmission of the alarm, the transmission is executed via the SRC module **105** to an LRC **2**, configured to transmit the alarm to a remote information and communications center **3** and/or an emergency response means **4**.

**[0060]** An embodiment comprises a personal and emergency identification device, ID **1**, comprising of at least one electronic memory storage device, processor, sensor, and wireless transmission module operationally connected to one or more persons or objects and capable of being programmed with identification information of said person or object and reporting said information to an external receiving device. Said ID **1** being capable of producing and transmitting a first set of signals, an alarm, comprising information representing properties of said emergency or other designated electronic information.

**[0061]** In an embodiment, the LRC **2** is configured with a processor in signal communication with a memory storage device, which is programmed to capture and record said wearer’s information over a wireless or direct connection to a computer or cellular phone and store it on the memory storage device to until a predetermined time such as when the device is powered on (an event occurrence) to produce a second signal to another receiving device **2** of said data representing the personal stored information; the Wearer presses a button on bracelet (ID **1**) for a predetermined prolonged period (5 seconds) allowing data to be programmed into the bracelet for storage. Once programmed, the bracelet is in a dormant/sleep mode until the event occurrence, or when the wearer or other person assisting the user presses bracelet activation button which then causes the processor to wake and send the stored personal data via wireless to the wearer’s or any other nearby cell phone.

**[0062]** The control means, being configured with the interface means **106**, allows for interface between the ID **1** and the user audibly, visually, or tactilely. Said interface means comprising a toggle to power on or off the ID, an audible means to alert the wearer of any number of parameters and events, an event occurrence alarm, a communication transmission or reception, or low power level. Said interface means further comprising a microphone, allowing the wearer audibly communicate instructions to the ID **1**, for example requesting the communication to summon the EMS **4** assistance.

**[0063]** Said control means being configured and interface means **106** further being configured with a detecting means to detect the integrity of contact between the wearer and ID **1**. Such detection means preferably being a pressure sensor or an optical proximity sensor attached to the contact side of the ID **1**. Alternatively, said detection means may be configured as another means for detecting human body activity, such as pulse oximetry, near-infrared spectroscopy, electromyography means, echocardiography means, plethysmography means, or electroencephalography. The ID **1** being configured where the lack of integrity of contact between the wearer and ID **1** would cause the ID to go into a “sleep mode” or power down to preserve battery power.

**[0064]** A preferred embodiment of the invention provides that at least in part the data transmission from the ID **1** may be encrypted with 128 WPA by other data encryption means. For example, wearer’s name, physical description, and location would not be encrypted and would be available for viewing on the cellular telephone device; however, the wearer’s medical records would not, and would only be available for viewing when received by the EMS **4**.

**[0065]** In the foregoing specification, specific embodiments have been described. However, one of ordinary skill in the art appreciates that various modifications and changes can be made without departing from the scope of the invention as set forth in the claims below. Accordingly, the specification and figures are to be regarded in an illustrative rather than a restrictive sense, and all such modifications are intended to be included within the scope of present teachings.

**[0066]** The benefits, advantages, solutions to problems, and any element(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential features or elements of any or all the claims. The invention is defined

solely by the appended claims including any amendments made during the pendency of this application and all equivalents of those claims as issued.

**[0067]** Moreover in this document, relational terms such as first and second, top and bottom, and the like may be used solely to distinguish one entity or action from another entity or action without necessarily requiring or implying any actual such relationship or order between such entities or actions. The terms “comprises,” “comprising,” “has,” “having,” “includes,” “including,” “contains,” “containing” or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises, has, includes, contains a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. An element preceded by “comprises . . . a”, “has . . . a”, “includes . . . a”, “contains . . . a” does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that comprises, has, includes, contains the element. The terms “a” and “an” are defined as one or more unless explicitly stated otherwise herein. The terms “substantially”, “essentially”, “approximately”, “about” or any other version thereof, are defined as being close to as understood by one of ordinary skill in the art. The terms “coupled” and “linked” as used herein is defined as connected, although not necessarily directly and not necessarily mechanically. A device or structure that is “configured” in a certain way is configured in at least that way, but may also be configured in ways that are not listed. Also, the sequence of steps in a flow diagram or elements in the claims, even when preceded by a letter does not imply or require that sequence.

1. The invention as described herein.

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