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(54) **METHOD AND SYSTEM FOR PROCESSING INFORMATION BASED ON DETECTED BIOMETRIC EVENT DATA**

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(56) **References Cited**

U.S. PATENT DOCUMENTS

5,552,806 A 9/1996 Lenchik
5,646,608 A 7/1997 Shintani

(Continued)

FOREIGN PATENT DOCUMENTS

EP 1045355 A1 10/2000
WO 2005078676 A2 8/2005

OTHER PUBLICATIONS

International Search Report, PCT/IL 2005/000191, mailed Sep. 9, 2005, 5 pages.

(Continued)

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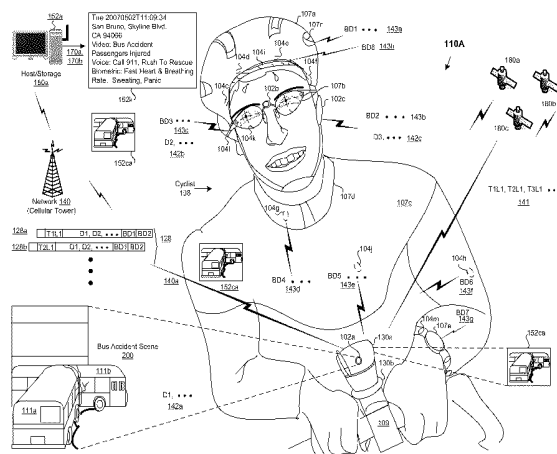
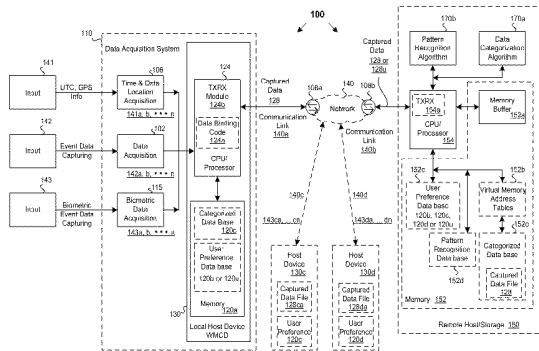
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(57) **ABSTRACT**

A system and method is provided for processing and storing captured data in a wireless communication device based on detected biometric event data. The captured data may be acquired through a data acquisition system with devices or sensors in an integrated or distributed configuration. The captured data may include multimedia data of an event with time, date and/or location stamping, and captured physiological and behavioral biometric event data in response to the event. The captured data may be dynamically stored in a data binding format or as raw data in a local host device or communicated externally to be stored in a remote host or storage. At least one user preference may be specified for linking a biometric event data to the mapped, analyzed, categorized and stored captured data in a database. Captured data may be retrieved by matching biometric event data to at least one user preference from the database.

20 Claims, 6 Drawing Sheets



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(56) **References Cited**

U.S. PATENT DOCUMENTS

6,314,297	B1	11/2001	Karl	
7,203,486	B2	4/2007	Patel	
7,769,207	B2 *	8/2010	Olivo et al.	382/115
2003/0149649	A1 *	8/2003	Conkwright et al.	705/35
2003/0163710	A1	8/2003	Ortiz et al.	
2004/0143454	A1 *	7/2004	Kimmel	705/2
2007/0239991	A1	10/2007	Cheng	
2008/0002861	A1	1/2008	Yano et al.	
2009/0002178	A1	1/2009	Guday et al.	
2009/0164400	A1 *	6/2009	Amer-Yahia et al.	706/45
2009/0207252	A1	8/2009	Raghunath	

OTHER PUBLICATIONS

Seagate Technology LLC, Seagate D.A.V.E. (Digital Audio Video Experience) Transform the consumer digital content experience with the Seagate D.A.V.E. design concept, Data Sheet, 2007.
 Seagate Tecnology LLC. Seagate D.A.V.E. (Digital Audio Video Experience) The portable storage platform that collects, plays and manages digital content, Product Overview, 2007.
 todaysthv.com, KTHV Little Rock (Mind-Reading Toys Wave of the Future) The Associated Press, Apr. 30, 2007.

* cited by examiner

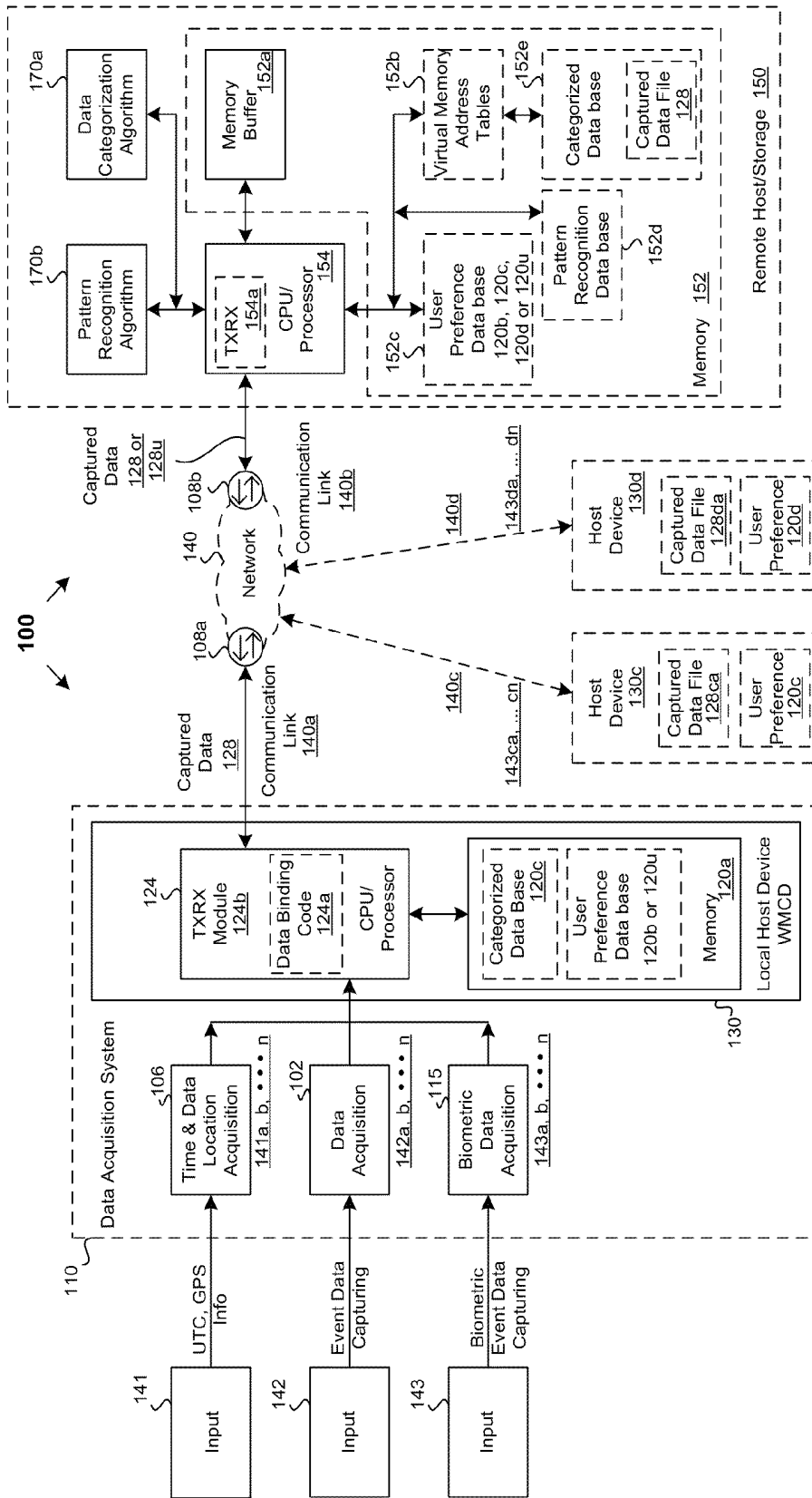


FIG. 1A

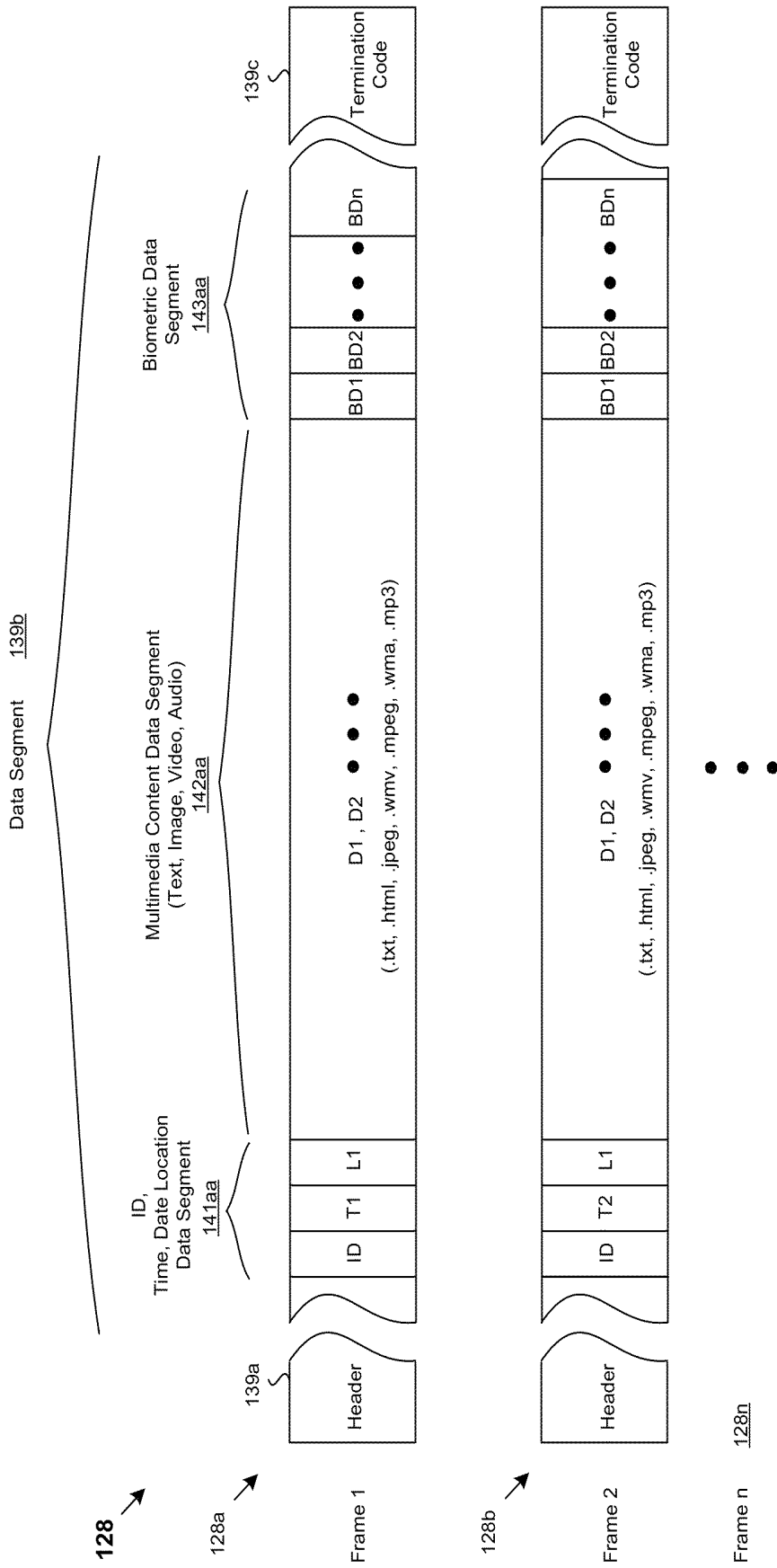


FIG. 1C

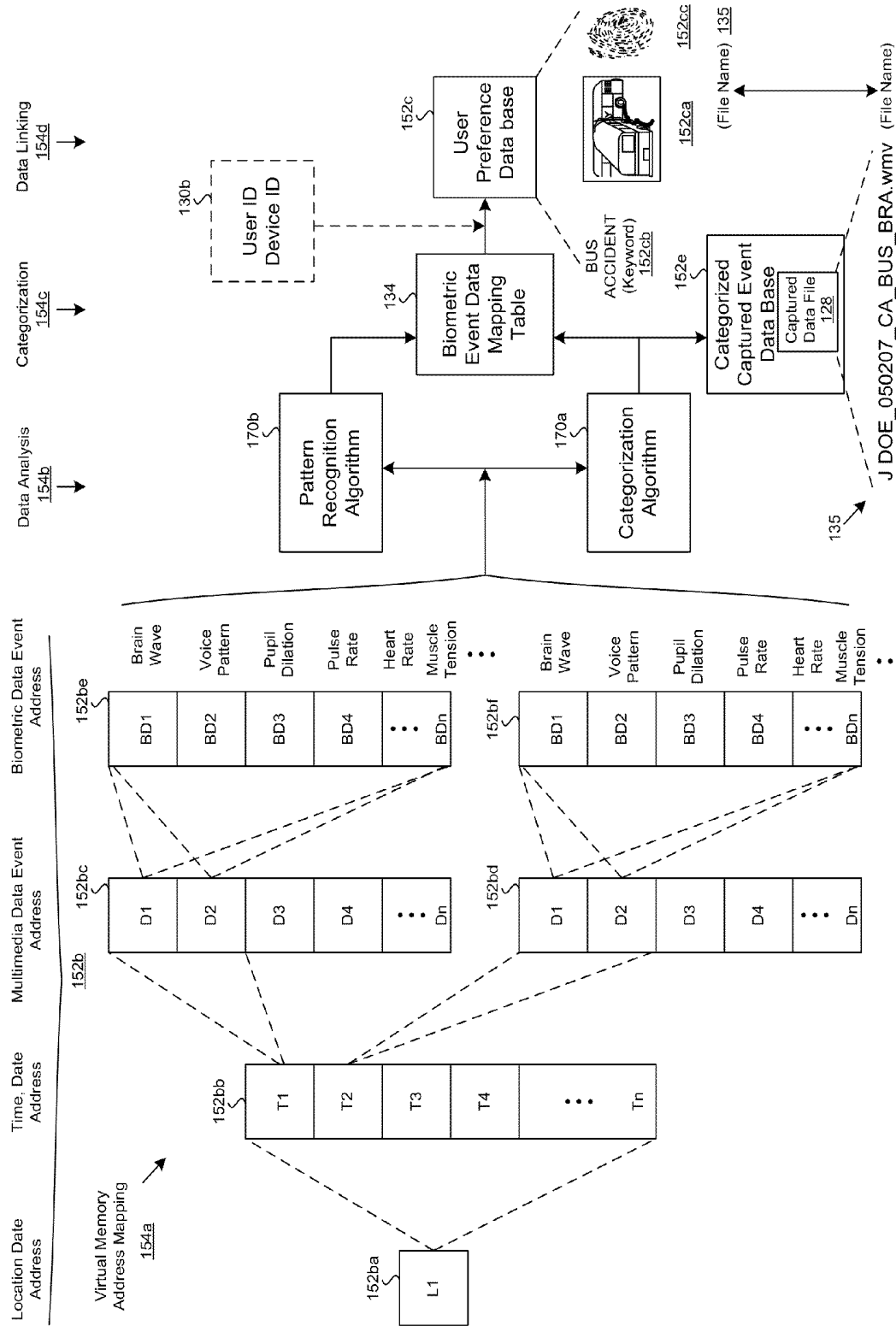


FIG. 1D

134

Biometric Data Mapping Table

	E+	E-	M+	M-	C+	C-	P+	P-	...
	Mood Condition 134b		Mental State 134c		Character Condition 134d		Physical Condition 134a		
1	Happy	Upset	Decisive	Hesitant	Truthful	Not Truthful	Comfortable	Hungry	
2	Proudful	Agitated	Confident	Lack Confidence	Credible	Not Credible		Cold	
3	Pleased	Angry	Calm	Startled	Kind	Unkind		Hot	→ BD4, BD8
4	Excited	Outraged	Alert	Unclear	Aggressive	Passive		Fever	
5	Relaxed	Rushed	Agreement	Disagreement	Courteous	Uncourteous	Relaxed	Blood Pressure Rise	→ BD7
6		Anxious	•	•	Enthusiastic	Indifferent		Nausea	
7	Uplifting	Sad	•	•	Proactive	Reactive		Sweating	→ BD8
8		Grief	•	•	Brave	Timid		Breathing Rate Rise	→ BD5
9	Hopeful	Depressed			Pleasant	Rude	Muscle Relax	Muscle Tension	→ BD6
10	Motivated	Demotivated			Deliberate	Unfocused	Comfortable	Uncomfortable	
11	Satisfied	Dissatisfied			•	•	Strong	Weak	
12	•	•			•	•	Loud	Soft	→ BD1, BD4, BD5, BD6, BD7, 5
13	•	•			•	•	•	•	
•	•	•			•	•	•	•	

FIG. 1E

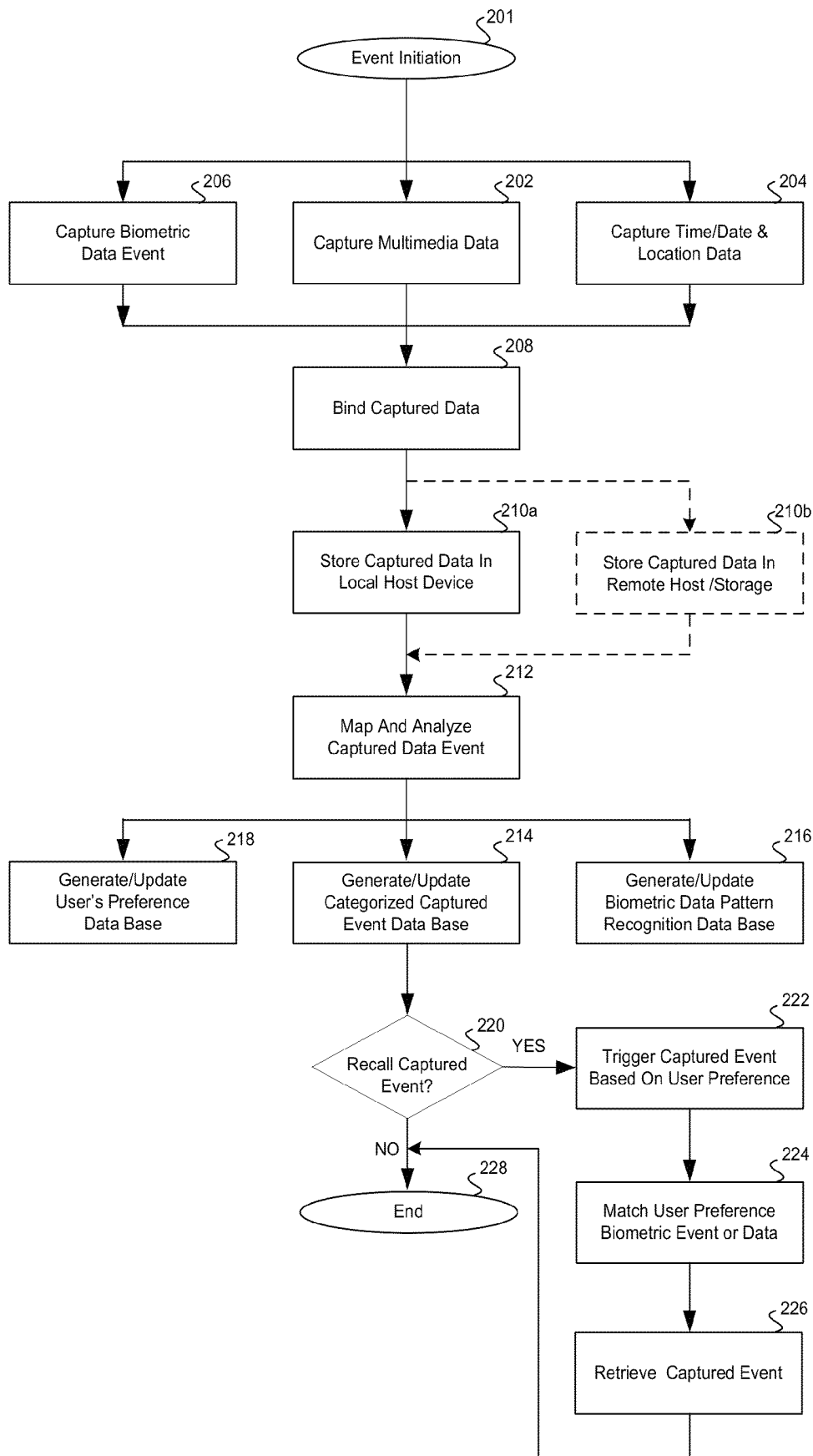


FIG. 2

METHOD AND SYSTEM FOR PROCESSING INFORMATION BASED ON DETECTED BIOMETRIC EVENT DATA

CROSS-REFERENCE TO RELATED
APPLICATIONS/INCORPORATION BY
REFERENCE

This application claims priority to and is a continuation of co-pending U.S. patent application titled "METHOD AND SYSTEM FOR PROCESSING INFORMATION BASED ON DETECTED BIOMETRIC EVENT DATA" filed on Sep. 26, 2007 and assigned application Ser. No. 11/861,786, which claims priority to United States Provisional application filed on Jul. 20, 2007 and assigned Ser. No. 60/950,952.

This application also makes reference to:
U.S. patent application Ser. No. 11/861,224 filed on Sep. 25, 2007;
U.S. patent application Ser. No. 11/861,220 filed on Sep. 25, 2007; and
U.S. patent application Ser. No. 11/861,219 filed on Sep. 25, 2007.

Each of the above stated applications is hereby incorporated herein by reference in its entirety

FIELD OF THE INVENTION

Certain embodiments of the invention relate to wireless communication. More specifically, certain embodiments of the invention relate to a method and system for processing information based on detected biometric event data.

BACKGROUND OF THE INVENTION

The field of wireless communication has seen dramatic growth over the last few years. Currently, most people use their wireless devices, be it cellular phones, PDA's, laptops, and/or other devices, for various purposes, business and personal, on a constant and daily basis. Society is truly becoming a wireless one. Many wireless solutions have been introduced, and have made tremendous strides into everyday life.

For example, the use of Wireless Personal Area Networks (WPAN) has been gaining popularity in a great number of applications because of the flexibility and convenience in connectivity they provide. WPAN systems generally replace cumbersome cabling and/or wiring used to connect peripheral devices and/or mobile terminals by providing short distance wireless links that allow connectivity within very narrow spatial limits. WPAN may be based on standardized technologies, for example Class 2 Bluetooth© technology. While WPAN may be very beneficial for certain applications, other applications may require larger service areas and/or capabilities.

To satisfy such needs, other technologies have been developed to provide greater wireless service. Wireless Local Area Networks (WLAN) systems may operate within a wider range. In contrast to the WPAN systems, WLAN provide connectivity to devices that are located within a slightly larger geographical area, such as the area covered by a building or a campus. WLAN systems are generally based on specific standards, for example IEEE 802.11 standard specifications to supplement the communication capacity provided by traditional wired Local Area Networks (LANs) installed in the same geographic area as the WLAN system.

In short, wireless networks may exist to support wireless mobile communication devices (WMCDs). However, while WMCDs have continued to grow in complexity and capabil-

ity, these WMCDs still continue to suffer from some major limitations, especially physical limitations and power.

Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art, through comparison of such systems with the present invention as set forth in the remainder of the present application with reference to the drawings.

BRIEF SUMMARY OF THE INVENTION

A method and/or system is provided for processing information based on detected biometric event data, substantially as shown in and/or described in accordance to at least one of the figures, as set forth more completely in the claims.

Various advantages, aspects and novel features of the present invention, as well as details of an illustrated embodiment thereof, will be more fully understood from the following description and drawings.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

FIG. 1A is a block diagram of an exemplary data capturing system used for capturing data event based on user's biometric event data, in accordance with an embodiment of the invention.

FIG. 1B illustrates an exemplary physical implementation of a data acquisition system capturing data content based on user's biometric event data, in accordance with an embodiment of the invention.

FIG. 1C illustrates exemplary data frame structure of captured data, in accordance with an embodiment of the invention.

FIG. 1D illustrates an exemplary process of virtual memory address mapping and user preference generation based on biometric event data, in accordance with an embodiment of the invention.

FIG. 1E illustrates an exemplary biometric event data mapping table based on data detected from biometric sensors, in accordance with an embodiment of the invention.

FIG. 2 is a flow diagram illustrating exemplary steps for capturing and storing of data based on detected biometric event data, in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Certain aspects of the invention may be found in a method and system for processing information based on detected biometric event data. Exemplary aspects of the invention may comprise capturing data and/or one or more events based on one or more detected biometric event data, and storing the captured data locally in a local host device and/or in a remote communication device. The captured data may be multimedia content data comprising text, speech, speech to text translation, video, still image, audio signal, or data received from analog or digital inputs. The captured data may be time, date or location stamped and concurrently tagged with detected biometric event data of one or more users in the vicinity. The captured data and the respective detected biometric event data may be mapped, analyzed, categorized and/or stored into respective databases in the memory for future retrieval.

Various data may be captured through a data acquisition system comprising one or more devices or sensors. The time, date and location information may be acquired through a GPS receiver and/or a combination of user data entry and/or from a network clock synchronization protocol. An information or

data filtering system such as a user preference may be generated and/or used to retrieve and/or link captured data efficiently from the categorized stored captured data. The user preference may comprise a link to associated information such as the time, date, location stamps and the biometric event data, that may be utilized to identify the stored captured data. The biometric event data may be mapped to a biometric event data base such as a biometric event data mapping table unique to each user. Captured data may be retrieved by recalling or matching to one or more biometric event data experienced by one or more respective users from respective user preferences.

FIG. 1A is a block diagram of an exemplary data capturing system used for capturing data event based on user's biometric event data, in accordance with an embodiment of the invention. Referring to FIG. 1A, there is shown an exemplary data capturing system 100 comprising a plurality of inputs 141, 142 and 143, a data acquisition system 110, an optional communication network 140 and an optional remote host or storage 150.

The input 141 may comprise at least one of the inputs of time, date and location information that may be obtained via GPS signals. The input 141 may be used for time, date and location stamping of data acquired from input 142. The input 141 of time information may be received in the format of local time, Coordinated Universal Time (UTC) or the Greenwich Mean Time GMT. A local time may be derived from the UTC based on the local geographical location. In another embodiment of the invention, the input 141 may utilize the IEEE 1588-2002 standard for a precision clock synchronized protocol to time stamp data communicated via a network such as the Ethernet. The location information of input 141 may be obtained via GPS signals, where location coordinates may be interpreted to provide detailed location such as street address, city name, zip code, or country code.

The input 142 may comprise event data or contents of interest intended for storage in the form of analog or digital signals. In an embodiment of the invention, the input 142 may comprise multimedia data content in the form of text, speech, speech to text translation, video, audio or still image data. Exemplary non-multimedia data content such as environmental data related to temperature, humidity, wind speed, air pressure, or ambient noise level may be included in the data content of input 142.

The input 143 may comprise biometric event data of a user that may be used to prompt or trigger data capturing of events from input 142. The biometric event data to input 143, may be classified into two main types: physiological and behavioral biometric event data. A physiological biometric event data may be data related to an event that tests, reads or captures a physical aspect of the body such as facial features, finger prints, hand shape, iris blood vessel pattern (iris scan), DNA sequences, pulse rate, pulse pressure, muscle tension. In addition to the biometric event data of an individual user, surrounding people in the vicinity may contribute biometric event data to the input 143 through additional host devices 130c and 130d where respective biometric event data from host devices 130c or 130d may be simultaneously communicated to the local host device 130 or to the remote host or storage 150 through communication links 140c and 140d.

A behavioral biometric event data may comprise data indicative of personality, or a behavior change in response to an event taking place. For example, handwriting, voice signature, a rise in pulse pressure, rise in pulse rate, skin temperature changes, sweating, pupil dilation, breathing rate change, change in tone of voice may indicate anxiety, anger, excitement, distress, rigorous physical activities, startle, fear,

or mental unrest. Biometric event data from an Electroencephalogram (EEG) that detects brain wave may indicate mental state and mental activity. Speech pattern, tone of voice, speech to text translation and content analysis, galvanic skin response may provide biometric event data as an indication of the circumstances of the environment, type of stimulus received and a reaction to the stimulus.

The captured biometric event data may be utilized to construct or reconstruct a story or a journal of personal experience. A correlated set of time, date and location information along with biometric event data and data collected for an external event may be useful in devising a data linking path to speed up a search algorithm to identify captured events or stored data for future retrieval.

The data acquisition system 110 may comprise a plurality of data acquisition devices or sensors 102, 106, 115 and a local host device such as a wireless mobile communication device 130 (WMCD). In an embodiment of the invention, the plurality of data acquisition devices or sensors 102, 106, 115 may be discrete devices or sensors in a distributed system 110. The respective data from inputs 141, 142 and 143 may be communicated to the wireless mobile communication device WMCD 130 through wireless transmission such as using Bluetooth or Wireless Personal Area Network (WPAN) technology. For longer range transmission, a WLAN with a wireless access point, for example, may be used. In another embodiment of the invention, the plurality of data acquisition devices or sensors 102, 106, 115 may be integrated into fewer devices, or into a single wireless mobile communication device WMCD 130 forming an integrated data acquisition system 110. Alternately, a combination of distributed and integrated data acquisition system 110 may be used.

The data acquisition devices or sensors 102 may comprise a plurality of devices or sensors. For example a video camera may capture video content or motion pictures, a camera may capture still images, a scanner may capture text, graphics or still images, and a microphone. audio decoder or audio receiver may capture voice or audio data content. Non multimedia environmental sensors such as a thermocouple may capture temperature data, a hygrometer may capture humidity data, a pressure gauge may capture atmospheric pressure data, a Pitot tube may capture air flow velocity and a microphone may capture an ambient noise level. The captured data 142a, 142b to 142n from respective device or sensors 102 may be communicated to the WMCD 130 as digitized raw data, or may be communicated as formatted data frames.

The data acquisition device or sensor 106 may comprise a GPS receiver, a reference clock, time input from the IEEE 1588-2002 standard precision clock synchronized protocol or a data entry by a user at the start of recording the input 102. The data 141a, 141b to 141n may communicate time, date and location information to the WMCD 130 for synchronization with the captured data from respective data acquisition devices or sensors 102 and 115.

The data acquisition device or sensor 115 may comprise a plurality of biometric acquisition devices or sensors. For example, an EKG device with a plurality of electrodes may monitor heart activity, rate or pulse rate, an EEG device with a plurality of electrodes may monitor brain waves pattern and activities, a Galvanic skin response electrode or electrodermic sensor may monitor electrical resistance of the skin as indication of sympathetic activity and emotional arousal. Additionally, a scanner may scan finger print, facial feature, iris blood vessel pattern, monitor pupil dilation, eye movement. A thermal couple may monitor body temperature, a pressure transducer may monitor pulse pressure, a microphone, an audio receiver may record audio data, a voice

encoder may encode voice and a conductance transducer may monitor body sweat. The acquired biometric event data **143a**, **143b** to **143n** may be communicated to the WMCD **130** as digitized raw data, or may be communicated as a higher level interpreted data such as an emotional or mental state indication.

The wireless mobile communication device (WMCD) **130** may comprise a memory **120a**, a CPU or a processor **124**, and an integrated transmit/receive communication interface (TXRX module) **124b**. The WMCD **130** may perform services and functions such as a smart mobile phone, a PDA and may communicate to external devices through wireless communications such as Bluetooth. The WMCD **130** may include other function as a local host device to perform a range of tasks such as data management, data binding or formatting the captured data **142a** to **142n** into another data format such as tagging captured data **128** for network transmission. In an embodiment of the invention, data binding codes **124a** may be used to tag or pre-tag the captured data **142a** to **142n** with suitable identifications such as time, date or location data **141a** to **141n** and/or biometric event data **143a** to **143n**.

In an embodiment of the invention, the captured data **128** may be biometrically tagged and stored locally into the memory **120a** in the WMCD **130**. The captured data **128** may further be categorized and sorted based on the tagged information using for example, time, date, location, biometric event data and stored in a categorized data base **120c** for future retrieval or processing. The pre-tagging or tagging of captured data **128** are discussed in U.S. patent application Ser. Nos. 11/861,224 and 11/861,220, both filed on Sep. 25, 2007; and is hereby incorporated by reference in its entirety.

The WMCD **130** may store a user preference **120b** for the captured data **128**. The user preference **120b** may comprise a link to associated information or data **141a** to **141n** such as the time, date, location stamps and the biometric event data **143a** to **143n** to identify the captured data **142a** to **142n**. The user preference **120b** may be stored in the memory **120a** of the WMCD **130**, and may be triggered to retrieve captured data efficiently from the categorized data base **120c**. The biometric event data **143a** to **143n** may be mapped to a biometric event data base unique to the respective person.

In another embodiment of the invention, additional multiple biometric event data **143ca** to **143cn**, **143da** to **143dn** from multiple users or host devices **130c** or **130d** may be concurrently or independently acquired when input data **142a** to **142n** are being captured by the local host device **130**. The concurrently or independently acquired biometric event data **143ca** to **143cn**, **143da** to **143dn** may optionally be mapped, parsed, or appended to the captured data **128** from the local host device **130** and may optionally be stored as an updated captured data **128u** locally in the host memory **120a** or remotely in the memory **152** in the remote host or storage **150**.

Optionally, one or more user preferences **120b**, **120c** or **120d** may be specified to map or associate the biometric event data **143a** to **143n**, **143ca** to **143cn**, **143da** to **143dn** from the multiple users or host devices **130**, **130c** or **130d** to link to the captured data **142a** to **142n** for later retrieval. Optionally, an updated user preference **120u** may be specified to map or associate the biometric event data **143a** to **143n**, **143ca** to **143cn**, **143da** to **143dn** from the multiple users or host devices **130**, **130c** or **130d** to link to the captured data **142a** to **142n** for later retrieval. By recalling or matching to one or more of biometric event data (i.e. **143a** to **143n**, **143ca** to **143cn** or **143da** to **143dn**) to one or more of the specified user preferences **120b**, **120c** or **120d** or the updated multiple user preference **120u**, the respective captured data **128** or the updated captured data **128u** may be retrieved.

In another embodiment of the invention, the captured data **128** or **128u** may be stored or further processed in an optional remote host or storage **150**. For example, if the local host device **130** has limited memory for storage, it may be desirable to store the captured data **128** or **128u** in the remote host or storage **150**. Other reasons may be due to conserving the battery of the WMCD **130**, limited processing capacity in the CPU/processor **124**, or a lack of appropriate application to process the captured data **128** in the local host device **130**.

The WMCD **130** may comprise suitable hardware, logic, circuitry, and/or code that may be adapted to provide wireless router functions to enable routing or transmission of respective data **141a** to **141n**, **142a** to **142n**, **143a** to **143n** as unprocessed raw data format to the remote host or storage **150** for further processing.

For remote processing, the transmit/receive TXRX module **124b** may communicate the raw data **141a** to **141n**, **142a** to **142n**, **143a** to **143n** or the captured data **128** through a communication link **140a** to the remote host or storage **150**. The communication links **140a**, **140b** to the network **140** such as the Ethernet may be via a wired link or a wireless link. The communication links **140a**, **140b** may be encrypted for secured communication between the local host device of WMCD **130** and the remote host or storage **150**.

The local host device WMCD **130** and the remote host or storage **150** may comprise suitable hardware, logic, circuitry, and/or code that may be adapted to provide wired or wireless networking operations through communication links **140a**, **140b**. The wired or wireless communication links **140a**, **140b** may be accessed from a WLAN infrastructure network **140** via a portal **108a** and **108b**. The portal **108a** and **108b** may comprise suitable hardware, logic, circuitry, and/or code and may be adapted to integrate the WLAN infrastructure network **140** with non-IEEE 802.11 networks. Moreover, the portal **108a** and **108b** may also be adapted to perform the functional operations of a bridge, such as range extension and/or translation between different frame formats, in order to integrate the WLAN infrastructure network **140** with IEEE 802.11-based networks.

In an embodiment of the invention, the remote host or storage **150** may comprise a CPU/processor **154**, an integrated TXRX module **154a**, a memory **152**, one or more applications such as a data categorization algorithm and/or a pattern recognition algorithm. The remote host or storage **150** may have similar functions as the local host device WMCD **130**, except may be with expanded capacity in the memory **152**, the CPU/processor **154** processing power, or with the necessary operating system and applications for processing, categorizing, reading and writing the captured data **128** into the various data bases.

A data categorization algorithm **170a** may be executed under an operating system by the CPU/Processor **154** in the memory buffer **152a** to perform categorization on the captured data **128**. The data categorization algorithm **170a** may comprise one or more applications to sort and analyze one or more data segments according to the instructions provided in the header portion of the captured data **128**. Further description of an exemplary data structure of the captured data **128** will be discussed with respect to FIG. 1D. In this exemplary data structure, the captured data **128** may comprise data segments to include user name, device type, time, date, location information, multimedia data and biometric event data. The data categorization algorithm **170a** may generate or update a plurality of virtual memory address tables **152b** that categorize and link respective data segments to physical memory locations in a categorized database **152e**. The same data cat-

egorization algorithm **170a** may be executed to perform categorical search in the virtual memory address tables **152b** for data retrieval.

A pattern recognition algorithm **170b** may be executed under an optional operating system by the CPU/Processor **154** in the memory buffer **152a** to perform pattern recognition functions. The pattern recognition functions may comprise update or generation of pattern recognition data base **152d**, user biometric event data check, authentication and verification. The pattern recognition algorithm **170b** may comprise a plurality of biometric event data mapping applications and/or code, neural network intelligence application or artificial intelligence applications.

The pattern recognition algorithm **170b** may analyze the collected biometric event data from the captured data **128** to infer mood, mental state, character portrayal, personality analysis, physical activities or health conditions at the input **141** time instances, when input event data **142** and **143** were captured. The pattern recognition analysis may comprise voice recognition, speech to text translation content analysis, speech pattern analysis, EEG brain waves pattern, eye movements, galvanic skin response, EKG pulse rate, breathing rate, pulse pressure, pupil dilation and muscle tension analysis.

The inferred results from the pattern recognition analysis may be dynamically generated or mapped to a category in a biometric event data mapping table **134** under the categorized database **152e**. An unrecognized pattern may be generated and categorically stored as a new template with digitized biometric event data pattern in the pattern recognition data base **152d**. A user preference **152c** may be generated or dynamically updated to link the captured data **128** to the categorized data base **152e**. The user preference **152c** may comprise a plurality of instances with data tags that links the user preference **152c** to the virtual memory address tables **152b** such that data may be fetched from the categorized data base **152e** based on linked address routes.

The information in the user preference **152c**, the pattern recognition database **152d** and the captured data **128aa** in the categorized data base **152e** from the remote host or storage **150** may be retrieved and communicated to the WMCD **130** or any available resources in a network upon user's request and upon successful authentication and verification of user's identity and user's preference **152c** based on biometric event data. The generation of user's preferences and rendering of multimedia content on dissimilar format devices based on user's biometric event data is disclosed in U.S. patent application Ser. No. 11/861,219 titled "Method And System For Configuring Local And Remote Resources To Accomplish Rendering Of Multimedia Content On Dissimilar Format Devices Based On User Biometric Data" filed on Sep. 25, 2007; and is incorporated herein by reference in its entirety.

FIG. 1B illustrates an exemplary physical implementation of a data acquisition system capturing data content based on user's biometric event data, in accordance with an embodiment of the invention. Referring to FIG. 1B, there is shown a data acquisition system **110A** worn by a user (Cyclist) **108** witnessing a bus accident scene or event **200** and triggering communication of a captured data **128** to a remote host or storage **150a** through a wireless network **140a**. The data acquisition system **110A** may comprise a plurality of data acquisition devices and sensor such as a Bluetooth enabled hearing and speech device **102c**, a Bluetooth enabled cyclist helmet **107a**, a Bluetooth enabled cyclist goggle **107b**, a Bluetooth enabled cyclist jersey **107c**, a Bluetooth enabled wrist watch **107e**, and a local host device such as a wireless mobile communication device (WMCD) **130a**. Biometric

event data comprises physiological biometric event data and behavioral biometric event data.

The Bluetooth enabled hearing and speech device **102c** may capture and communicate the audio data **D3 142c** of the cyclist **108** such as an emergency **911** phone call via the WMCD **130b**. The audio receiver of the Bluetooth enabled hearing and speech device **102c** may pick up audio data **D3 142c** content including surrounding sound of the bus accident scene **200**, the 911 operator dialogue content and the heavy breathing biometric event data **BD2 143b** of the cyclist **108** peddling towards the scene to render rescue to injured passengers. The audio data **D3 142c** and biometric event data **BD2 143b** may be communicated through Bluetooth wireless signals and stored into the WMCD **130a** local memory. Alternately, the audio data **D3 142c** and biometric event data **BD2 143b** may be communicated to the remote host or storage **150a** as captured data **128** through a communication link **140a** such as a cellular network **140**.

The Bluetooth enabled cyclist helmet **107a** may capture and communicate the brain wave pattern of the cyclist **108** in response to witnessing the bus accident scene **200**. The Bluetooth enabled cyclist helmet **107a** may comprise a cyclist helmet with embedded EEG electrodes **104c**, **104d**, **104e** and **104f** to measure the left and right brain activities. The Bluetooth enabled cyclist helmet **107a** may also comprise a thermocouple/conductance electrode **104i** along the forehead of the cyclist **108** to measure the temperature and skin moisture conductivity data (sweat detection). The EEG brain wave data, temperature data and the moisture conductivity data may be communicated respectively as **BD1 143a** and **BD8 143h** through a patch antenna **107n** on the Bluetooth enabled cyclist helmet **107a** to the WMCD **130a** through Bluetooth wireless signals.

The Bluetooth enabled cyclist goggle **107b** may capture and communicate snap shots of still images of the scene, or detect eye movements and pupil dilation of the cyclist **108**, in response to witnessing the bus accident scene **200** event. The Bluetooth enabled cyclist goggle **107b** may comprise a camera **102b** to capture still images of the bus accident scene **200** event as data **D2 142b**. In an embodiment of the invention, the goggle lens may be a scanner with targeting cross hair grids **104k** to detect eye movement and pupil dilation, capturing biometric event data **BD3 143c**. The Bluetooth enabled cyclist goggle **107b** may use a goggle frame antenna **104l** to communicate data **D2 142b** and biometric event data **BD3 143c** to the WMCD **130a** through Bluetooth wireless signals.

The Bluetooth enabled cyclist jersey **107c** may capture and communicate biometric event data such as pulse rate, EKG heart rhythm, breathing pattern, muscle tension and Galvanic skin response of the cyclist **108**, in response to witnessing the bus accident scene **200**. The Bluetooth enabled cyclist jersey **107c** may comprise embedded pressure transducers or electrodes **104g**, **104h** and **104j**. Pressure transducers, or electrodes **104g** may be embedded on the collar **107d** to measure the pulse rate or Galvanic skin response as biometric event data **BD4 143d**. Pressure transducers or electrodes **104h** may measure muscle tension or Galvanic skin response as biometric event data **BD6 143f**. Pressure transducers or electrodes **104j** may measure the EKG heart rhythm or pulse rate or breathing pattern as biometric event data **BD5 143e**. The biometric event data **BD4 143d** to **BD6 143f** may be communicated to the WMCD **130a** through Bluetooth wireless signals.

The Bluetooth enabled wrist watch **107e** may capture and communicate biometric event data such as pulse rate, pulse pressure, EKG heart rhythm, muscle tension and Galvanic skin response of the cyclist **108**, in response to witnessing the

bus accident scene **200**. In an embodiment of the invention, the Bluetooth enabled wrist watch **107e** may function as a local host device with similar functions as the WMCD **130a** such as a smart phone capable of communicating or transferring captured data **128** to the wireless network **140a**. The Bluetooth enabled wrist watch **107e** may comprise embedded pressure transducers or electrodes **104m** capable of measuring pulse rate, pulse pressure, EKG heart rhythm, muscle tension and Galvanic skin response of the cyclist **108** as biometric event data **BD7 143g**. The biometric event data **BD7 143g** may be communicated to the WMCD **130a** through Bluetooth wireless signals.

The WMCD **130a** may capture and communicate video clips **D1 142a** or snap shots of still images of the bus accident scene **200** between buses **111a** and **111b**. In an embodiment of the invention, the video or still camera **102a** on the WMCD **130a** may follow the eye movements detected by the targeting cross hair grids **104k** of the Bluetooth cyclist goggle **107b**. The WMCD **130a** may be mounted on a motorized micro gyro **130b** on the bicycle frame **109** to allow radial movement mimicking the eye movement. In an embodiment of the invention, the WMCD **130a** may comprise an optional GPS receiver to receive time, date, location data **TL1 141** from a plurality of GPS satellites **180a** to **180c**.

In an embodiment of the invention, the WMCD **130a** may perform data binding on the acquired multimedia data **D1 142a**, **D2 142b**, **D3 142c** and the biometric event data **BD1 143a** to **BD8 143h**, and transmit the captured data **128** as time, date and location stamped data frames **128a** and **128b** through wireless network **140a**. In another embodiment of the invention, the WMCD **130a** may not perform data binding. The captured multimedia data **D1 142a**, **D2 142b**, **D3 142c** and the biometric event data **BD1 143a** to **BD8 143h** may be time stamped by the IEEE 1588-2000 synchronized clock protocol and transmitted in the network **140**.

In another embodiment of the invention, the WMCD **130a** may generate a user preference **120b** based on biometric event data at the time captured data **128** may be stored in the local memory or communicated to the remote host or storage **150a**. The user preference **120b** may link the biometric event data such as finger print, iris scan, voice recognition a behavioral condition or mental state of the cyclist **108** in the captured data **128**. The user preference **120b** may be used to gain future access to the network **140a** or to search for captured data of the bus accident scene **200** through a process of user preference authentication, validation using a pattern recognition algorithm **170b**.

The remote host or storage **150a** may comprise similar functions as the remote host or storage **150** described in FIG. **1A**. In an embodiment of the invention, the remote host or storage **150a** may use the data categorization algorithm **170a** and/or a pattern recognition algorithm **170b** to analyze, construct a data mapping table, store a summary or synopsis **152k** or generate a user preference icon **152ca** with a bus accident scene. The icon **152ca** may be communicated and stored locally in the user preference **120b** in the form of a graphical user interface (GUI) such as the icon **152ca** or as a compressed image file.

In an alternate embodiment of the invention shown in FIG. **1D**, the user preference may be a text keyword **152cb**, a file name **135** or a biometric event data such as a finger print **152cc** of the cyclist **108**. In an alternate embodiment of the invention, the keyword may be a biometric event data such as a spoken phrase "BUS ACCIDENT" **152cb** linking the captured data **128** or to the summary **152k** of the bus accident scene or event **200** to be displayed on his WMCD **130a** or other resources in the network.

To retrieve the data **128** from the memory **152**, the cyclist **108** may select the icon **152ca** from a GUI on his WMCD **130a**, type in a "BUS ACCIDENT" keyword **152cb**, speak the keyword phrase "BUS ACCIDENT" **152cb** or use any biometric event data that may relate his experience of witnessing the bus accident scene **200** or describe a multimedia data from the bus accident scene **200** to trigger captured data **128** retrieval. The categorization algorithm **170a** or pattern recognition algorithm **170b** may search and retrieve the captured data **128** as a video clip, audio or text data from the local memory of the WMCD **130a** or from the remote host or storage **150**.

FIG. **1C** illustrates an exemplary data structure of captured data frames, in accordance with an embodiment of the invention. Referring to FIG. **1C**, there is shown an exemplary data structure of captured data **128** comprising a plurality of captured data frames **128a**, **128b** to **128n**. In an embodiment of the invention, the WMCD **130a** may comprise data binding codes **124a** to bind respective captured data **141aa**, **142aa** and **143aa** from the respective plurality of data acquisition devices or sensors **106**, **102** and **115** into suitable communication format to form such as the exemplary captured data frames **128a**.

The captured data frame **128a** may comprise a header **139a**, a data segment **139b** and a termination code **139c**. The header **139a** may comprise data structure information and instructions to read and interpret the data segment **139b**. The header information may comprise one or more headers to indicate data format, the start and stop bit of the data frame **128a**, bit location of each data segment **141aa**, **142aa** and **143aa**, type of data in each data segment, operating system, application program interfaces and network protocol information such as protocol standard, security permission level or network transport layer. The header instructions may comprise calling for one or more interpreter application to interpret and/or process the data segment **139b**. In an event if more than one user's biometric data such as **143ca**, **143da** may be parsed into the data frame **128a**, multiple headers may be used to specify the location or the start and stop bits of the respective biometric data **143ca** or **143da** in the biometric data segment **143aa**.

The data segment **139b** may comprise one or more types of data to be interpreted or processed. In this example, the data segment **139b** may comprise three data segments **141aa**, **142aa** and **143aa**. The data segment **141** as may comprise data relating to the identification of the data such as the name of the cyclist **108** (user), device ID, time, date or location information. Each data frame **128a** may be time, date or optionally location stamped so that data may be categorized for storage or for retrieval in proper time sequence.

The data segment **142aa** may comprise acquired multimedia content data, or external data directly transferred or imported to the WMCD **130a** from other external devices. In an embodiment of the invention, the multimedia data may be text, still image, graphics, video, audio, speech or a combination of the data type. Data binding format may be in a suitable industry standard for transmission, display or for storage. For example, the multimedia data format may be designated by suffixes such as .txt (text keyboard) or .html (Hypertext Markup Language) for the text and web pages, .jpeg (Joint Photographic Experts Group) for the compressed still images or graphics, .wmv (Windows Media Video) or .mpeg (Motion Pictures Expert Group) for video or motion picture file, .wma (Windows Media Audio) or .mp3 (MPEG Layer 3) for audio or music file format.

The data segment **143aa** may comprise acquired digitized readings from biometric devices or sensors. The digitized

readings may be analog electrical signals or waveforms converted into digital format for transmission. In this example, the readings from the BD1 to BDn may represent readings of the EEG brain wave, Galvanic skin responses, speech pattern, voice pitch, Iris scanned image, finger print, pulse pressure, pulse rate, eye movements, pupil dilation response, conductivity, muscle tension, or EKG heart rhythm.

The termination code may comprise codes to terminate data frame reading, or parity check. A captured data 128 may comprise of sequences of time stamped captured data frames 128a to 128n. The content of the data segments 141aa, 142aa, 143aa may be extracted by one or more applications called out in the header 139a or in the CPU/processor 154 or 124 for processing.

FIG. 1D illustrates an exemplary process of virtual memory address mapping and user preference generation based on biometric event data, in accordance with an embodiment of the invention. Referring to FIG. 1D, there is shown a virtual memory address mapping step 154a, a data analysis step 154b (using applicable algorithms 170a and 170b), a data categorization step 154c (to generate a biometric event data mapping table 124 and categorized data base 152e) and a data linking step 154d (to generate user preference).

The virtual memory address mapping step 154a may comprise using a virtual memory address table 152b to map captured data 128 from a virtual memory address to a physical memory location. The virtual memory address table 152b may be an imaginary memory area supported by an operating system program such as an operating system in conjunction with the hardware associated with the memory 152. Since the captured data 128 may be striped over a distributed area on a memory device such as a RAID drive or on a flash memory, the virtual memory address table 152b may be a logical and convenient description for software programs to process captured data 128. Each of the data segments 141aa, 142aa and 143aa of data frames 128a to 128n is mapped into the new virtual memory location (or the respective physical memory locations) such as the biometric event data mapping table 124 and/or the categorized data base 152e.

The virtual memory address table 152b may be constructed from data extracted from each of data segments 141aa, 142aa and 143aa. In this example, the virtual memory address table 152b may comprise a location address column 152ba, a time and date address column 152bb, a multimedia data address column 152bc, 152bd and a biometric event data address column 152be and 152bf. The location address column 152ba may comprise of location data L1. In this example, the bus accident scene or event 200 may be recorded in the same vicinity or location L1. The time and date address column 152bb may comprise of time and date data T1 to Tn, corresponding to the respective data frames 128a to 128n.

The multimedia data address column 152bc, 152bd may comprise data D1 to Dn of the data segment 142aa corresponding to the first two captured data frames 128a and 128b. For example, the data D1 may be a video file, D2 may be an image file, D3 may be an audio file, D4 may be a text file. It is not necessary for the multimedia data address column 152bc or 152bd to have all of the mentioned data D1 to Dn be arranged in the ascending or descending order. The order may be random, so long as a linking path for each data D1 to Dn may be established with other related corresponding data.

The biometric event data address column 152be and 152bf may comprise biometric event data BD1 to BDn of the data segment 143aa corresponding to the first two captured data frames 128a and 128b. For example, the biometric event data BD1 may be from the EEG brain wave data of the left and/or right brain for brain activity analysis. The biometric event

data BD2 may be from audio speech pattern, speech content, voice pitch for user recognition or for mood condition, mental state, and character or behavior analysis. The biometric event data BD3 may be eye movement detection, pupil dilation, iris scan.

The biometric event data BD4 may be for example pulse rate, pulse pressure, or Galvanic skin response data. The biometric event data BD5 to BDn may be from pulse rate, heart rate, EKG heart rhythm pattern, muscle tension, breathing rate. In certain instances, it may not be necessary for the biometric event data address column 152be or 152bf to have all of the mentioned biometric event data BD1 to BDn be arranged in the ascending or descending order. The order may be random, so long as a linking path for each biometric event data BD1 to BDn may be established with other related corresponding data.

In the data analysis step 154b and categorization step 154c, the time and date stamped multimedia data D1 to Dn and biometric event data BD1 to BDn may be analyzed separately or combined with other biometric event data using a categorization algorithm 170a and/or a pattern recognition algorithm 170b to generate a biometric event data mapping table 134. A categorized data base 152e may be generated from the multimedia data D1 to Dn. An exemplary captured data file name 135 "JDOE_050207_CA_BUS_BRA.wmv" in this example may be saved and named in the categorized data base 152e. The name of the data file 135 may be user defined, or may be generated from a default algorithm or from a related user preference based on the user ID, date or time stamp, location, a keyword of the event and/or designating a biometric event data such as a bravery act of the cyclist 108.

A user preference 152c may optionally be defined by a user cyclist 108, or may be generated by a user preference algorithm automatically in the WMCD 130a or remote host or storage 150. The user preference 152c such as a GUI object such as an icon or compressed image file 152ca of the bus accident, a spoken phrase or a text or keyword 152cb of "BUS ACCIDENT", or a biometric event data such as the finger print pattern 152cc of the cyclist 108 may be generated in the data linking step 154d. Based on the user preference 152c, the CPU/Processor 124 or 154 to execute one or more suitable programs using stored or captured data file 135 linked by a virtual memory addresses routes defined in the user preference 152c.

FIG. 1E illustrates an exemplary biometric event data mapping table based on data or readings detected from biometric sensors, in accordance with an embodiment of the invention. Referring to FIG. 1E, the exemplary biometric event data mapping table 134 may be generated from the results of data analysis step 154b and categorization step 154c described in FIG. 1D. In this example, the exemplary biometric event data mapping table 134 may suggest analyzed mapping results of biometric event data BD1 to BDn of captured data frames 128a to 128n. The suggested mapped results may have a physiological category comprising a physical condition column 134a and a behavioral category comprising a plurality of behavioral columns such as a mood condition column 134b, a mental state column 134c and a character condition column 134d.

Each of the categories, the physical condition 134a, the mood conditions 134b, the mental state 134c and the character conditions 134d may further be classified with a positive condition or a negative condition represented by P+, P-, E+, E-, M+, M- and C+, C- to describe the opposing conditions or to contrast the condition for comparison purpose. Other ways of categorizing the biometric event data mapping table 134 may be used. In another embodiment of the invention, a

weighing factor or a range may be specified to describe the different degrees of physiological or behavioral conditions.

The biometric event data mapping table **134** may be populated with a plurality of commonly known health and psychological conditions or events to profile the cyclist's **108** reaction in witnessing the bus accident **200**. In this example, to name a few, the cyclist's **108** physical condition **134a** may be mapped with indications in column P+ of feeling physically strong from biometric event data BD1 (EEG brain waves), BD4 (Pulse rate), BD5 (EKG heart rhythm, heart rate), BD6 (muscle tension, Galvanic Skin Response), and BD7 (pulse rate). The cyclist's **108** voice was recorded as loud compared to normal condition from biometric event data BD2 (voice pattern, pitch, volume). The P- column may indicate the cyclist's **108** body was feeling hot from biometric event data BD4 (pulse rate) and BD8 (thermocouple reading, moisture reading from skin conductivity or Galvanic skin response) due to fast pedaling to the bus accident scene **200** to render rescue.

Likewise, the mood condition **134b** may be mapped with indications in column E+ of feeling motivated from biometric event data BD1 (EEG brain waves), BD2 (speech content analysis, voice pattern), BD3 (eye movement, pupil dilation), BD6 (muscle tension, Galvanic Skin Response). The E- column may indicate the cyclist **108** was anxious from biometric event data BD1 (EEG brain waves), BD2 (speech content analysis, voice pattern), BD3 (eye movement, pupil dilation), BD4 (Pulse rate), BD5 (EKG heart rhythm, heart rate), BD6 (muscle tension, Galvanic Skin Response), BD7 (pulse rate) and BD8 (thermocouple reading, moisture reading from skin conductivity or Galvanic skin response).

Similarly, the mental state and character condition of the cyclist **108** may be found from the biometric event data mapping table **134** shown in FIG. 1E with respective highlighted mapped biometric event data. Each condition indicated in the biometric event data mapping table **134** may be generated from combining the results or inferences of data analysis **154b** using the categorization algorithm **170a** and the pattern recognition algorithm **170b** described in FIG. 1D.

FIG. 2 is a flow diagram illustrating exemplary steps for capturing and storing of data based on detected biometric event data, in accordance with an embodiment of the invention. Referring to FIG. 2 following start step **201**, data acquisitions may take place in steps **202**, **204** and **206**. Step **202** may acquire or capture data input **142** from an event such as the bus accident scene or event **200**. In step **202**, the input data **142** may be captured as multimedia data **142a** to **142n** by a data acquisition system **102** comprising at least one or more devices or sensors such as a WMCD **130a** (local host device), a Bluetooth enabled cyclist goggle **107b**, and/or a Bluetooth enabled hearing and speech device **102c**. The WMCD **130a** may capture data text, video or still image multimedia data D1 **142a**, the Bluetooth cyclist goggle **107b** may capture text, or still image multimedia data D2 **142b**, and the Bluetooth enabled hearing and speech device **102c** may capture audio data D3 **142c**.

In step **204**, time, date data T1 to Tn may be acquired via a reference clock, time data from the IEEE 1588-2002 standard precision clock synchronized protocol or a data entry by a user at the start of recording multimedia data **142a** to **142n** from data acquisition system **102**. Optionally, location data L1 may be acquired with a GPS receiver. The time, date and/or location information may be used for time, date and/or location stamping of the acquired data **142a** to **142n**.

In step **206**, a plurality of biometric devices or sensors such as the Bluetooth enabled hearing and speech device **102c**, the Bluetooth enabled cyclist helmet **107a**, the Bluetooth enabled

cyclist goggle **107b**, the Bluetooth enabled cyclist jersey **107c** and the Bluetooth enabled wrist watch **107e** may acquire biometric event data BD1 **143a** to BDn **143n** such as biometric event data: EEG brain wave, Galvanic skin responses, speech pattern, voice pitch, Iris scanned image, finger print, pulse pressure, pulse rate, eye movement, pupil dilation, skin conductivity, muscle tension, or EKG heart rhythm.

In step **208**, respective captured data **141a** to **141n**, **142a** to **142n**, **143a** to **143n** from respective data acquisition devices or sensors **106**, **102**, **115** in steps **202**, **204** and **206** may be bound into suitable format for storage or for network communication. The captured multimedia data D1 **142a** to Dn **142n** of the bus accident scene or event **200** may be respectively tagged and formatted into frames of captured data **128a** to **128n** with respective time, date and location stamping and biometric event data for local or remote storage. In another embodiment of the invention, the captured data from steps **202**, **204** and **206** may be stored or communicated as raw data without the data binding step **208**.

The captured data **128** may be stored locally in step **210a**, or remotely in step **210b**. In step **210a**, the captured data **128** may be stored into the local memory **120a** of the local host device such as the WMCD **130**. Alternately, in step **210b**, the captured data **128** may be communicated through the network **140** and stored remotely in a remote host or storage **150**.

In step **212**, captured data **128** from steps **210a** or **210b** may be virtually mapped to link data from physical memory **152** to a virtual memory address table **152b**. The virtual memory address table **152b** may comprise location addresses **152ba**, time and date addresses **152bb**, multimedia data addresses **152bc** and **152bd**, biometric event data addresses **152be** and **152bf**. The captured data **128** may be analyzed according to one or more corresponding data segments **141aa**, **142aa**, **143aa** by one or more applications such as the categorization algorithm **170a** and/or the pattern recognition algorithm **170b**.

The analyzed data results of step **212** may be categorized to generate or update corresponding databases such as the categorized captured event data base **152e**, the pattern recognition data base **152b** and the user preference data base **152c**. The categorized captured event data base **152e** may be generated or updated in step **214** using the categorization algorithm **170a**. The captured data **128** may be stored in the categorized data base **152e** under a file name **135**. The categorized captured data **128** may be sorted and searched according to time date, location, multimedia data content, or certain biometric event data.

The pattern recognition data base **152d** may be generated or updated in step **216**. A pattern recognition algorithm **170b** may utilize captured biometric event data to generate a new pattern recognition data base **152d**, or update an existing pattern recognition data base **152d**. Analyzed biometric event data such as finger print, iris scan, pupil dilation, voice recognition, speech pattern, EEG brain wave pattern, EKG heart rhythm pattern, galvanic skin response, the physical condition **134a**, the mood condition **134b**, the mental state **134c** or character condition **134d** may be stored into the pattern recognition database **152d**. In an embodiment of the invention, the pattern recognition database **152d** may comprise a biometric event data mapping table **134**.

The user preference data base **152c** may be generated or updated in step **218**. User preference for the captured bus accident scene or event **200** may be generated to trigger or recall the captured data **128**. In an embodiment of the invention, the user preference may be an icon or compressed image **152ca**, as a text, a keyword or a spoken phrase **152cb**, or as a

biometric event data characteristic to the cyclist **108** such as a finger print **152cc** or a Galvanic skin response.

In step **220**, there may be a request to recall the captured event **128**. If the request may be confirmed, in step **222** user preference **152ca**, **152cb** or **152cc** may be used to trigger for a search of the captured event or data **128**. In step **224**, the pattern recognition data base **152d** may match one or more of the biometric event data such as data from the biometric event data mapping table **134** against the user preference **152ca**, **152cb** or **152cc**. For example, the cyclist **108** may recall anxious feelings seeing a bus picture. The cyclist' **108** EEG brain wave pattern may be used by a pattern recognition algorithm **170b** to match the biometric event data in the user preference data base **152c**.

In instances when a match may be found with the user preference, the stored captured data event linked to the user preference may be retrieved from the WMCD **130** or from the remote host or storage **150** in step **226**. In instances where there may be no request to recall captured data or event **128**, or if the retrieval is completed, the process may terminate in step **228**.

The steps of the process in FIG. **2** may be rearranged in a different order or substituted with similar or equivalent operation to accomplish the same results of capturing and storing of data based on detected biometric event data, without departing from the scope and spirit of the invention.

In accordance with various embodiments of the invention, the method for processing data **142a** to **142n** may comprise in a wireless communication device WMCD **130** capturing data such as time, date location data **141a** to **141n**, multimedia data **142a** to **142n** and biometric event data **143a** to **143n** based on a detected biometric event data. The time, date location data **141a** to **141n** may be captured by acquisition devices or sensors **106** such as a synchronized clock, a GPS receiver or network time input from IEEE 1588-2002 standard precision clock synchronized protocol.

The multimedia data **142a** to **142n** may be captured by data acquisition devices or sensors **102** such as the WMCD **130**, the Bluetooth enabled hearing and speech device **102c**, the Bluetooth enabled cyclist goggle **107b**. The WMCD **130** may comprise a still camera or video camera **102a** for still image or video data sensing. The Bluetooth enabled hearing and speech device **102c** may comprise a microphone, a voice encoder, or an audio receiver for audio data capturing. The Bluetooth enabled cyclist goggle **107b** may comprise a scanner or a camera **102b** for still image data capturing.

The biometric event data **143a** to **143n** may be captured by data acquisition devices or sensors **115** such as the Bluetooth enabled hearing and speech device **102c**, the Bluetooth enabled cyclist helmet **107a**, the Bluetooth cyclist goggle **107b**, the Bluetooth enabled cyclist jersey **107c** and the Bluetooth enabled wrist watch **107e**. Electrodes may be used to capture EEG brain wave pattern, a Bluetooth enabled hearing and speech device **102c** to capture speech pattern, speech content, or voice recognition, electrodes or pressure transducer to capture pulse rate, pulse pressure, muscle tension, EKG heart rhythm or breathing rate, scanner to capture eye movement, pupil dilation or finger print or electrodes to capture Galvanic skin response.

The captured data **128** may be stored locally at the WMCD **130** or externally at a remote host or storage **150**. The biometric event data such as pulse rate, pulse pressure, muscle tension, EKG heart rhythm, breathing rate, eye movement, pupil dilation, or finger print may comprise a physiological event. The biometric event data such as EEG brain wave pattern, speech pattern, speech content, voice recognition or Galvanic skin response may comprise a behavioral event.

The captured data **128** may comprise one or more of audio, video, still image and text content **D1 142a**, **D2 142b**, **D3 142c**, and capturing the captured data **128** may be based on user preference **152c**. The user preference **152c** may be modified or updated based on the captured data **128** and/or the biometric event data **BD1 143a** by linking the user preference **152c** to the categorized data base **152e** and/or to the biometric event data mapping table **134**.

The captured data **128** may be retrieved locally from the WMCD **130** or externally from the remote host or storage **150** based on using the biometric event data from the user preference **152c** to trigger the retrieval. A successful retrieval of the stored captured data **128** may be triggered by substantially matching from the pattern recognition database **152d** a user's biometric event data such as the EEG brain wave pattern **BD1 143a** to the detected biometric event data stored in the user preference **152c** using a pattern recognition algorithm **170b**.

Certain embodiments of the invention may comprise a machine-readable storage having stored thereon, a computer program having at least one code section for processing information based on detected biometric event data, the at least one code section being executable by a machine for causing the machine to perform one or more of the steps described herein.

Accordingly, aspects of the invention may be realized in hardware, software, firmware or a combination thereof. The invention may be realized in a centralized fashion in at least one computer system or in a distributed fashion where different elements are spread across several interconnected computer systems. Any kind of computer system or other apparatus adapted for carrying out the methods described herein is suited. A typical combination of hardware, software and firmware may be a general-purpose computer system with a computer program that, when being loaded and executed, controls the computer system such that it carries out the methods described herein.

One embodiment of the present invention may be implemented as a board level product, as a single chip, application specific integrated circuit (ASIC), or with varying levels integrated on a single chip with other portions of the system as separate components. The degree of integration of the system will primarily be determined by speed and cost considerations. Because of the sophisticated nature of modern processors, it is possible to utilize a commercially available processor, which may be implemented external to an ASIC implementation of the present system. Alternatively, if the processor is available as an ASIC core or logic block, then the commercially available processor may be implemented as part of an ASIC device with various functions implemented as firmware.

The present invention may also be embedded in a computer program product, which comprises all the features enabling the implementation of the methods described herein, and which when loaded in a computer system is able to carry out these methods. Computer program in the present context may mean, for example, any expression, in any language, code or notation, of a set of instructions intended to cause a system having an information processing capability to perform a particular function either directly or after either or both of the following: a) conversion to another language, code or notation; b) reproduction in a different material form. However, other meanings of computer program within the understanding of those skilled in the art are also contemplated by the present invention.

While the invention has been described with reference to certain embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted without departing from the scope of the present

invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the present invention without departing from its scope. Therefore, it is intended that the present invention not be limited to the particular embodiments disclosed, but that the present invention will include all embodiments falling within the scope of the appended claims.

What is claimed is:

1. A method comprising: capturing, in a computing device, input data; capturing, in the computing device, biometric event data via one or more biometric sensors concurrent to the capturing of the input data; and mapping at least a portion of the biometric event data to at least a portion of the captured input data, wherein: the mapping comprises mapping the at least a portion of the biometric event data to a biometric event database; and the mapped at least a portion of the biometric event data indicates a behavioral condition of a user during the capturing of the input data.
2. The method according to claim 1, further comprises: analyzing the biometric event data to establish varying degrees of the behavioral condition of the user for contrast.
3. The method according to claim 1, wherein the input data comprises one or more of audio content, video content, image content, or text content.
4. The method according to claim 1, wherein the capturing of the input data is based at least in part on a user preference.
5. The method according to claim 4, further comprising: modifying the user preference based on the input data or the biometric event data.
6. The method according to claim 4, further comprising: matching the biometric event data with information in the user preference or a pattern recognition database.
7. The method according to claim 1, wherein the one or more biometric sensors comprise one or more of an Electroencephalogram (EEG) sensor, Electrocardiogram (EKG) sensor, a temperature sensor, a galvanic skin response sensor, audio sensor, or an optical scanner or sensor.
8. The method according to claim 1, wherein the computing device comprises a wireless communication device.
9. The method according to claim 1, wherein the capturing of the input data is facilitated by one or more of a still camera, a video camera, a microphone, or a text input device.
10. A system, comprising: circuitry configured to: capture input data via an input capture device; capture biometric event data via one or more biometric sensors concurrent to the capturing of the input data; and map at least a portion of the biometric event data to at least a portion of the captured input data, wherein:

the mapping comprises mapping the at least a portion of the biometric event data to a biometric event database; and

the mapped at least a portion of the biometric event data indicates a behavioral condition of a user during the capturing of the input data.

11. The system according to claim 10, wherein the circuitry is configured to analyze the biometric event data to establish varying degrees of the behavioral condition of the user for contrast.

12. The system according to claim 10, wherein the captured data comprises one or more of audio, video, still image, and text content.

13. The system according to claim 10, wherein the input data is captured based at least in part on a user preference.

14. The system according to claim 13, wherein the circuitry is configured to modify the user preference based at least in part on the input data or the biometric event data.

15. The system according to claim 13, wherein the circuitry is configured to match the biometric event data with information in the user preference or a pattern recognition database.

16. The system according to claim 10, wherein the one or more biometric sensors comprise one or more of an EEG sensor, EKG sensor, a temperature sensor, a galvanic skin response sensor, audio sensor, or an optical scanner or sensor.

17. The system according to claim 10, wherein the capture device comprises one or more of a still camera, a video camera, a microphone, or a text input device.

18. A non-transitory computer-readable medium having a program recorded thereon, the program configured to perform a method when executed on a computing device, the method comprising:

- capturing input data via an input capture device;
- capturing biometric event data via one or more biometric sensors concurrent to the capturing of the input data; and
- mapping at least a portion of the biometric event data to at least a portion of the captured input data, wherein: the mapping comprises mapping the at least a portion of the biometric event data to a biometric event database; and the mapped at least a portion of the biometric event data indicates a behavioral condition of a user during the capturing of the input data.

19. The non-transitory computer-readable medium according to claim 18, wherein the method further comprises analyzing the biometric event data to establish varying degrees of the behavioral condition for contrast.

20. The non-transitory computer-readable medium according to claim 18, wherein the one or more biometric sensors comprise one or more of an EEG sensor, EKG sensor, a temperature sensor, a galvanic skin response sensor, audio sensor, or an optical scanner or sensor.

* * * * *

专利名称(译)	用于基于检测到的生物特征事件数据处理信息的方法和系统		
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当前申请(专利权)人(译)	博通公司		
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CPC分类号	G06F17/30914 A61B5/002 A61B5/0024 A61B5/02055 A61B5/0476 A61B5/1112 A61B5/165 A61B5/4803 A61B5/681 A61B5/6814 G01D9/005 G01D21/00 G06K9/00892 G06K9/00979 H04L63/0861 H04W12/06 A61B3/112 A61B3/113 A61B5/0022 A61B5/024 A61B5/0402 A61B5/0488 A61B5/0531 A61B5/0816 A61B5/117 A61B5/16 H04M1/7253 H04M1/72569 H04M2250/10 H04M2250/12 H04W88/02 G06F16/2379 G06F16/285 G06F16/84		
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优先权	60/950952 2007-07-20 US		
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摘要(译)

提供了一种系统和方法，用于基于检测到的生物特征事件数据在无线通信设备中处理和存储捕获的数据。捕获的数据可以通过数据采集系统采集，其中设备或传感器采用集成或分布式配置。捕获的数据可以包括具有时间，日期和/或位置标记的事件的多媒体数据，以及响应于该事件捕获的生理和行为生物特征事件数据。捕获的数据可以以数据绑定格式动态存储，或者作为原始数据存储在本地主机设备中，或者外部通信以存储在远程主机或存储器中。可以指定至少一个用户偏好用于将生物特征事件数据链接到数据库中的映射，分析，分类和存储的捕获数据。可以通过将生物特征事件数据与来自数据库的至少一个用户偏好相匹配来检索捕获的数据。

