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LOCAL CONNECTED NETWORKS FOR OUTDOOR ACTIVITIES

Abstract

A system including a laser rangefinder determining a target distance; a riflescope comprising an adjustment mechanism for setting a target distance; and a notification device, producing a notification when the adjustment mechanism is set to a target distance corresponding to the target distance determined by the laser rangefinder.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of U.S. application Ser. No. 18/212,348, filed Jun. 21, 2023, the disclosures of which is incorporated by reference herein.

FIELD OF THE DISCLOSURE

[0002] Embodiments of this disclosure are directed to networks of connected devices, and more particularly to wireless networks of connected devices sharing sensor data for added functionality.

BACKGROUND

[0003] When undertaking outdoor activities such a hunting, camping, hiking and orienteering, participants typically have access to a number of different devices for navigating, ranging, aiming and communicating as well as a large quantity of constantly changing data. Many outdoor activities present participants with the need to understand logistical information such as their own geographical location as well as the location of a target or a destination. Weather conditions can have a substantial impact on the activity, such as wind speed and direction, temperature and pressure. In the case of hunting, nature observation or research, the locations, identification and activities of wildlife can be studied and analyzed. In addition, to make optimal use of the sophisticated tools or devices used in the outdoor activities, various adjustments or settings are available to be selected based on operating conditions. When two or more participants are involved in the activity, complexity increases to coordinate information for both efficiency and safety reasons.

[0004] What is needed is a system and technique for associating a number of connected devices and sharing data therebetween to provide added efficiency and functionality.

SUMMARY

[0005] One or more embodiments of the disclosure are directed to a system including two or more connected devices, such as a laser rangefinder and a riflescope that establishes a local connected network. A laser rangefinder determines a target distance and a riflescope has an adjustment mechanism for setting a target distance. A notification device produces a notification when the adjustment mechanism is set to a target distance corresponding to the target distance determined by the laser rangefinder. In some embodiments, each of the laser rangefinder and the riflescope include a network adapter, and the laser rangefinder and riflescope are connected with a computer connection. In some embodiments, the laser rangefinder and riflescope are connected by a wireless computer connection.

[0006] In some embodiments, the riflescope includes a sensor providing a first signal corresponding to the distance selected by the adjustment mechanism. In some embodiments, the laser rangefinder provides a second signal corresponding to the distance determined by the laser rangefinder. The notification device is configured to produce a notification when the first signal is substantially the same as the second signal.

[0007] In some embodiments, the notification device is an optical display, speaker device or a haptic device on the riflescope. In some embodiments, there is a further connected device connected to the riflescope by a computer connection such as a wireless connection, and the notification device is an optical display, speaker device or a haptic device on the connected device. The further connected device can be a mobile phone, a connected watch, or the like.

[0008] In another aspect of the invention, a system is provided including a laser rangefinder configured to determine a target distance and comprising a first network adapter; a riflescope comprising an adjustment mechanism for allowing a user to select a target distance and a second network adapter, wherein the first network adapter and the second network adapter are connected with a computer connection; and a notification device, producing a notification when the adjustment mechanism is set by a user to a selected target distance corresponding to the target distance determined by the laser rangefinder.

[0009] In some embodiments, the laser rangefinder and riflescope are connected by a wireless computer connection. In some embodiments, the riflescope comprises a sensor providing a first signal corresponding to the distance selected by the adjustment mechanism. In some embodiments, the laser rangefinder provides a second signal corresponding to the distance determined by the laser rangefinder.

[0010] In some embodiments, the notification device is configured to produce a notification when the first signal is substantially the same as the second signal. In some embodiments, the notification device is an optical display, speaker device or haptic device on the riflescope. In some embodiments, the system further includes a connected device connected to the riflescope, and wherein the notification device is an optical display, speaker device or a haptic device on the connected device.

[0011] In a further aspect of the invention, a system is provided including a laser rangefinder comprising a laser and a receiver configured to determine a target distance and providing a first signal corresponding to the determined target distance; a riflescope comprising an adjustment mechanism for selecting a target distance by a user and a sensor providing a second signal corresponding to the distance selected by the adjustment mechanism; and a notification device, producing a notification when the first signal is substantially the same as the second signal.

[0012] In some embodiments, the sensor is a rotational position sensor. In some embodiments, the laser rangefinder comprises a first network adapter and the riflescope comprises a second network adapter and the laser rangefinder and riflescope are connected with a computer connection. In some embodiments, the laser rangefinder and riflescope are connected by a wireless computer connection. In some embodiments, the system includes a mobile device comprising a third network adapter, wherein the laser rangefinder, the riflescope and the mobile device are connected by a wireless computer connection. In some embodiments, the notification device is an optical display, speaker device or a haptic device on the mobile device. In some embodiments, the notification device is an optical display, speaker device or haptic device on the riflescope.

[0013] In another aspect of the invention, a system is provided that includes two connected devices such as a ranging device for determining target information and an aiming device coupled to a firearm and comprising an accelerometer for detecting a shot fired by the firearm at a target location. A notification device produces a notification regarding the target location when the accelerometer detects a shot fired. In some embodiments, each of the ranging device and the aiming device include a network adapter, and the ranging device and the aiming device are connected with a computer connection. In some embodiments, the ranging device and the aiming device are connected by a wireless computer connection. In some embodiments, the aiming device is a riflescope or a red dot sight. In some embodiments, the ranging device is a laser rangefinder or rangefinding binoculars.

[0014] In some embodiments, the notification regarding the target location comprises the distance to the target. In some embodiments, a compass in provided to the aiming device and the notification regarding the target location comprises a heading to the target location. In some embodiments, a GPS sensor is provided to the ranging device and/or the aiming device and the notification regarding the target location comprises a GPS information regarding the target location.

[0015] In some embodiments, the notification device is an optical display, a speaker device or a haptic device on the riflescope. In some embodiments, the system further includes another connected device connected to the riflescope by a computer connection, and wherein the notification device is an optical display, a speaker device or a haptic device on the connected device. In some embodiments, the connected device is a mobile phone or a connected watch.

[0016] In a further aspect of the invention, a system includes two or more connected devices for two or more users that establishes a local connected network. A system includes a first connected device associated with a first firearm. The first connected device includes a first GPS sensor providing a first location thereof and a first compass providing a first heading corresponding to the direction of the barrel of the first firearm and a second connected device associated with a second firearm. The second connected device includes a second GPS sensor providing a second location thereof. The information of the first location, the first heading and second location is used to alert the users of the first user has aimed the first firearm towards the second user. A notification device provides a notification when the first location and the first heading indicates an interception with the second location. In some embodiments, the first connected device is a riflescope.

[0017] In some embodiments, first connected device comprises a network adapter and the second connected device comprises a network adapter and the first connected device and the second connected device are connected with a computer connection. In some embodiments, the first connected device and the second connected device are connected by a wireless computer connection.

[0018] In some embodiments, the notification device is an optical display, a speaker device or haptic device on the first connected device. In some embodiments, the notification device is an optical display for mapping the first location and the second location.

[0019] The above summary is not intended to describe each illustrated embodiment or every implementation of the present disclosure.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The drawings included in the present application are incorporated into, and form part of, the specification. They illustrate embodiments of the present disclosure and, along with the description, serve to explain the principles of the disclosure. The drawings are only illustrative of certain embodiments and do not limit the disclosure.

[0021] FIG. **1** depicts a local connected network in accordance with an exemplary embodiment of the disclosed subject matter.

[0022] FIG. **2** depicts a system architecture view of an optical aiming device, according to an exemplary embodiment of the disclosed subject matter.

[0023] FIG. **3** depicts a system architecture view of another optical aiming device, according to an exemplary embodiment of the disclosed subject matter.

[0024] FIG. **4** depicts a system architecture view of a rangefinder, according to an exemplary embodiment of the disclosed subject matter.

[0025] FIG. **5** depicts a system architecture view of binoculars, according to an exemplary embodiment of the disclosed subject matter.

[0026] FIG. **6** depicts a system architecture view of a spotting scope, according to an exemplary embodiment of the disclosed subject matter.

[0027] FIG. **7** depicts a system architecture view of a wrist-worn connected device, according to an exemplary embodiment of the disclosed subject matter.

[0028] FIG. **8** depicts a system architecture view of a trail camera, according to an exemplary embodiment of the disclosed subject matter.

[0029] FIG. **9** depicts a system architecture view of a connected device, according to an exemplary embodiment of the disclosed subject matter.

[0030] FIG. **10** depicts a system architecture view of a weather-related device, according to an exemplary embodiment of the disclosed subject matter.

[0031] While the embodiments of the disclosure are amenable to various modifications and alternative forms, specifics thereof have been shown by way of example in the drawings and will be described in detail. It should be understood, however, that the intention is not to limit the disclosure to the particular embodiments described. On the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the disclosure.

DETAILED DESCRIPTION

[0032] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only, and are not restrictive of the invention, as claimed. The following includes definitions of selected terms employed herein. The definitions include various examples and/or forms of components that fall within the scope of a term and that may be used for implementation. The examples are not intended to be limiting. Further, one having ordinary skill in the art will appreciate that the components discussed herein, may be combined, omitted or organized with other components or organized into different architectures.

[0033] In this description, the use of the singular includes the plural, the word “a” or “an” means “at least one,” and the use of “or” means “and/or,” unless specifically stated otherwise. Furthermore, the use of the term “including,” as well as other forms, such as “includes” and “included” is not limiting. Also, terms such as “element” or “component” encompass both elements or components comprising one unit and elements or components that comprise more than one unit unless specifically stated otherwise. The use of the term “or” in the claims and the present disclosure is used to mean “and/or” unless explicitly indicated to refer to alternatives only or the alternatives are mutually exclusive.

[0034] A “processor”, as used herein, processes signals and performs general computing and arithmetic functions. Signals processed by the processor may include digital signals, data signals, computer instructions, processor instructions, messages, a bit, a bit stream, or other means that may be received, transmitted, and/or detected. Generally, the processor may be a variety of various processors including multiple single and multicore processors and co-processors and other multiple single and multicore processor and co-processor architectures. The processor may include various modules to execute various functions. For example, a processor is configured to receive and execute various routines, programs, objects, components, logic, data structures, and so on to perform particular tasks or implement particular abstract data types.

[0035] A “memory”, as used herein, may include volatile memory and/or non-volatile memory. Non-volatile memory may include, for example, ROM (read only memory), PROM (programmable read only memory), EPROM (erasable PROM), and EEPROM (electrically erasable PROM). Volatile memory may include, for example, RAM (random access memory), synchronous RAM (SRAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), double data rate SDRAM (DDRSDRAM), and direct RAM bus RAM (DRRAM). The memory may store an operating system that controls or allocates resources of a computing device. In one or more embodiments, memory includes any media that is accessible to the electronic circuitry in the connected device. For example, in some embodiments, memory includes computer readable media located locally in the connected device and/or media located remotely to the riflescope **100** and accessible via a network.

[0036] A “disk” or “drive”, as used herein, may be a magnetic disk drive, a solid state disk drive, a floppy disk drive, a tape drive, a Zip drive, a flash memory card, and/or a memory stick. Furthermore, the disk may be a CD-ROM (compact disk ROM), a CD recordable drive (CD-R drive), a CD rewritable drive (CD-RW drive), and/or a digital video ROM drive (DVD-ROM). The disk may store an operating system that controls or allocates resources of a computing device.

[0037] A “bus”, as used herein, refers to an interconnected architecture that is operably connected to other computer components inside a computer or between computers. The bus may transfer data between the computer components. The bus may be a memory bus, a memory controller, a peripheral bus, an external bus, a crossbar switch, and/or a local bus, among others. The bus may also interconnects components using protocols such as Media Oriented Systems Transport (MOST), Controller Area network (CAN), Local Interconnect Network (LIN), among others. In various embodiments, the bus can be a wired connected between components.

[0038] A “database”, as used herein, may refer to a table, a set of tables, and a set of data stores (e.g., disks) and/or methods for accessing and/or manipulating those data stores.

[0039] An “operable connection”, or a connection by which entities are “operably connected”, is one in which signals, physical communications, and/or logical communications may be sent and/or received. An operable connection may include a wireless interface, a physical interface, a data interface, and/or an electrical interface.
[0040] A “computer communication”, as used herein, refers to a communication between two or more computing devices (e.g., connected device, computer, cellular telephone, network device) and may be, for example, a network transfer, a file transfer, an applet transfer, an email, a hypertext transfer protocol (HTTP) transfer, and so on. A computer communication may occur across, for example, a wireless system (e.g., IEEE 802.11), an Ethernet system (e.g., IEEE 802.3), a token ring system (e.g., IEEE 802.5), a local area network (LAN), a wide area network (WAN), a point-to-point system, a circuit switching system, a packet switching system, among others.
[0041] A “connected local network,” as used herein, refers two or more devices associated in a computer communication. When connected the two or more devices are capable of exchanging data, such as a sensor data, status data or any other information. The communication between the devices can be persistent, intermittent or on demand.
[0042] The aspects discussed herein may be described and implemented in the context of non-transitory computer-readable storage medium storing computer-executable instructions. Non-transitory computer-readable storage media include computer storage media and communication media. For example, flash memory drives, digital versatile discs (DVDs), compact discs (CDs), floppy disks, and tape cassettes. Non-transitory computer-readable storage media may include volatile and non-volatile, removable and non-removable media implemented in any method or technology for storage of information such as computer readable instructions, data structures, modules, or other data.
[0043] FIG. **1** is an exemplary component diagram of a connected system **1** for conducting activities, such as outdoor sports, recreation, hiking, nature research, navigation, and orienteering via multiple connected devices capable of capturing and sharing data.
[0044] System **1** can include multiple connected devices **10**, **20**, **30** and one or more user-centered devices **40**. Each of the devices **10**, **20**, **30** and **40** includes a network adapter **16**, **26**, **36** and **46** to provide a computer connection between devices and the internet **50**. The network adaptor **16**, **26**, **36**, **46** enables a computer communication with one or more external computing devices via one or more network protocols. For example, in various embodiments, connected devices **10**, **20**, **30**, **40** can communicate using one or more networks such as a local area network (LAN), a general wide area network (WAN), and/or a public network (e.g., the Internet) via network adapter **16**, **26**, **36**, **46**. In certain embodiments, network adaptor **16**, **26**, **36**, **46** communicates wirelessly, transmitting and receiving data over air. For example, in certain embodiments network adapter **16**, **26**, **36**, **46** can communicate using Wi-Fi, BLUETOOTH®, satellite or other suitable form of wireless communication. In some embodiments network adapter **16**, **26**, **36**, **46** can communicate to an external computing device via a wired connection. Typically, the connections **12**, **13**, **23**, **41**, **42** and **43** established between connected devices **10**, **20**, **30** and **40** are wireless connections and are collectively referred as the local connected network. The connections **12**, **13**, **23**, **41**, **42** and **43** may be durable or intermittent or upon request to conserve equipment battery power.
[0045] As will be described in greater detail herein, each of the connected devices **10**, **20**, **30**, **40** typically includes a processor, memory, a power source (such as a rechargeable battery) and one or more sensors. In addition, connected devices **10**, **20**, **30**, **40** can include various input and output devices to facilitate various modes of gathering of sensor data, providing information and notifications to the user.
[0046] One of the connected devices **40** can be interchangeably referred to as a user-centered device **40**, which may be a general purpose computing device such as a mobile phone, watch, tablet, or laptop computer. Typically, the user-centered device **40** is maintained in proximity with a user and is typically handheld or wearable (having a wrist strap, belt clip or ear clip) and additional

display screens, speakers or haptic devices accessible to the user. The user-centered device is connected to connected devices **10**, **20**, **30** via the local connected network and receives sensor data from the connected devices **10**, **20**, **30** and provides additional computing or analysis to sensor data, accumulates the data, presents data or notifications to the user, or connects to the internet **50** via a computer connection **54** to provide or receive information. The user-centered device **40** may include additional sensors as described herein. During the use of the local connected network, a user-centered device is optional and other connected devices **10**, **20**, **30** provide sensors and user notifications in lieu of the I/O provided on the user-centered device **40**.

Riflescope

[0047] FIG. **2** depicts a system architecture for electronic circuitry in a connected aiming device **100** for use in the local connected network. Connected aiming device **100** can be any optical aiming device or riflescope, according to one or more embodiments of the disclosure. The electronic circuitry of the riflescope **100** includes a processor **102**, power supply **101**, a memory **104**, network adaptor **106**, input/output (I/O) interface **108**, reticle display **110**, and a bus **112** that communicatively couples various system components. In some embodiments, a specialized database **114** is provided including maps, topographic information, ballistics data and other data files stored in memory **104**.

[0048] Bus **112** represents one or more of any of suitable bus structures for communicatively connecting the electronic circuitry of the riflescope **100**. For example, in one or more embodiments, I/O interface **108** is communicatively coupled with the reticle display **110**, processor **102** and memory **104** for emitting an output image via the display **110**. For example, in certain embodiments, the processor **102** generates an output that corresponds to a particular reticle pattern. The processor **102** can transmit this output to the I/O interface **108** that can then translate the processor output into instructions which are compatible with the display **110** and which result in the display **110** emitting an image corresponding to the reticle pattern.

[0049] In certain embodiments the I/O interface **108** facilitates communication with input and output devices for interacting with a user. For example, I/O interface **108** can communicate with one or more devices such as a user-input device **114** and/or an external display **112**, which enable a user to interact directly with the riflescope **100**. User-input device **114** may comprise one or more push-buttons, a touch screen, or other devices that allows a user to input information. External display **112** may comprise any of a variety of visual displays, such as a viewable screen, a set of viewable symbols or numbers, and so on. A speaker device and/or haptic vibratory unit **115** is provided to provide alerts to the user.

[0050] In some embodiments, the riflescope **100** includes a plurality of sensors in communication with the processor **102** via the bus **112** or other interfaces to provide information. In one configuration the riflescope **100** includes a GPS sensor **130**, an accelerometer **132**, a compass **134**, a temperature sensor **138**, a wind sensor **140**, a rotational position sensor **142**, an image sensor **144**, and an IR sensor **146**. The sensors may be disposed within the riflescope housing or proximate to the housing, or alternatively, may be disposed in a separate housing proximate to the housing of the riflescope **100**.

[0051] The GPS sensor **130** is implemented hardware, firmware or software to provide the geographical location of the riflescope **100**. In some embodiments, the GPS sensor **130** operates in coordination with the processor **102**, memory **104** and network adapter **106** to identify the location of the riflescope **100**. In some embodiments, the GPS sensor **130** is capable of identifying the location by downloading information via computer connection to cellular service, including map information. In some embodiments, the GPS **130** sensor may work with maps downloaded to the specialized database **114** in memory **104** and communicate via the network adapter **106** to with GPS satellites directly without reliance on cellular service. The location of the riflescope **100** as identified by the GPS sensor **130** can be used for waypoint setting by correlating the position to a map stored in the database **114**, or for geofencing, such that an alert is provided when the calculated location is determined to be entering or exiting a predetermined geofence. The alert may be provided visually on the reticle display **110**, on the external display **112** or via audible or haptic signals to the user via speaker unit/haptic feedback unit **115**. The waypoint and geofencing information can be shared with other connected devices on the local connected network, such as the rangefinder **300**, binoculars **400**, spotting scope **500** or watch **600** as described herein.

[0052] The accelerometer **132** can be a three-dimensional accelerometer implemented in hardware in the form of an accelerometer chip. In some embodiments, the accelerometer **132** is a six axis accelerometer implemented in hardware in the form of an accelerometer chip. The accelerometer **132** provides data regarding scope cant, e.g., to detect the angle of the device **100** (and the attached firearm) to one side or the other. For example, when viewing through the riflescope **100**, the cant angle will describe whether the horizontal crosswire is level. The accelerometer **132** provides data regarding tilt, e.g., when the firearm is aimed uphill or downhill such that the eyepiece is higher or lower than the objective/barrel side. The accelerometer **132** further provides data regarding recoil of the firearm, which can be used to detect shots fired by the firearm attached to the riflescope **100**. Accelerometer data can be provided visually on the riflescope **100** via the reticle display **110** or audibly/haptically via the speaker unit/haptic feedback unit **115**. The accelerometer information, such as shots fired, can also be shared with the other connected devices.

[0053] The compass **134** can be implemented, for example, as a magnetometer to provide the heading of the riflescope **100**. In some embodiments, the accelerometer **132** can be used in connection with the compass **134** to provide more accurate information regarding the motion of the riflescope **100**. For example, the heading information can be used to detect the direction in which the firearm coupled to the scope is being aimed. In some embodiments, the location of the riflescope **100**—as determined by the GPS sensor **140** and/or the range to the target—as determined by a ranging device such as the rangefinder **300** or binoculars **400** can be combined with the heading information of the compass **134** to direct the user to the target. For example, the heading information can be used to provide direction indicators to direct the user to face the target. For example the alert may be provided as visual arrows (left-right) on the reticle display **110** or by audible signals to the user via speaker unit **115**. Further direction indicators based on distance to the target may be used to direct the user to the target. For example the alert may be provided as visual arrows (forward-back) on the reticle display **110** or by audible signals to the user via speaker unit **115**.

[0054] The temperature sensor **138** is implemented in some embodiments as a thermocouple, a thermally sensitive resistor, a resistance temperature detector (RTD) or optical fiber sensor. The temperature sensor **138** can be used to detect ambient temperature or detect battery temperature and used to initiate heating of the battery when temperature is below a threshold. In some embodiments, an alert may be provided as a visual indication (cold battery) on the reticle display **110** or external display **112** to turn on a heating coil to warm the battery.

[0055] A wind sensor **140** is provided on the connected device **100** to provide information related to the wind speed and/or direction. Wind conditions can also be obtained by accessing weather stations via the network adapter **106**. By reliance on the wind sensor **140**, the processor **102** can provide windage correction holds for long range precision in windy conditions. Such information can be provided to the user via the reticle display **110**, external display **112** or audible or haptic signals to the user. The wind information can also be shared with other connected devices on the local connected network.

[0056] One or more adjustment mechanisms is provided on the riflescope **100**, e.g., the knobs or turret(s) of the scope **100**. A rotational position sensor **104** is associated with the adjustment mechanism to detect the setting of the adjustment mechanism. The rotational position sensor can be any known rotational position sensor. Rotational position sensors described in U.S. application Ser. Nos. 17/542,685, 18/076,035 and International Application PCT/US22/52020 are incorporated by reference in their entirety herein. A rotational position signal is provided from the rotational position sensor **142** via the bus **112** to the processor **102**. For example, the positional sensor **142** may provide a signal indicating the distance to which the scope **100** is adjusted, the "selected distance."

[0057] The image sensor **144** is used with optical camera lenses to provide still images or video of the view visible from the eyepiece, such as the reticle, surroundings and the target. For example, the image sensor **144** can record video of the last 10 seconds from the shoot. The image sensor **144** can also bracket the kill zone of the target in the field of view. The image sensor can be a CMOS image sensor or a CCD image sensor. Image sensor information can be shared with other connected devices on the local connected network.

[0058] The IR sensor **146** can detect the long range infrared band, e.g., from 7 μm-14 μm. IR sensors can be a microbolometer-based sensor made of vanadium oxide (VOx) or amorphous silicon (ASi). The IR sensor **146** can be used for thermal imaging to detect targets being viewed and can detect if a user is looking through the scope.

Red Dot Sight

[0059] FIG. **3** depicts a system architecture for electronic circuitry in a connected aiming device **200**, such as a red dot sight, for use in the local connected network. The electronic circuitry of the red dot sight **200** includes a processor **202**, power supply **201**, a memory **204**, network adaptor **206**, input/output (I/O) interface **208**, display **210**, and a bus **212** that communicatively couples various system components. In some embodiments, specialized database **214** is provided including maps, topographic information, ballistics data and other data files stored in memory **204**. Unless described below, the components of connected device **200** are substantially the same as those of connected device **100**.

[0060] In some embodiments, the red dot sight **200** includes a plurality of sensors in communication with the processor **202** via the bus **212** or other interfaces to provide information. In one configuration the red dot **200** may include an accelerometer **232** and an IR sensor **246**. The sensors may be disposed within the housing or proximate to the housing of the red dot sight **200**, or alternatively, may be disposed in a separate housing proximate to the housing of the red dot sight **200**. The accelerometer **232** can be a three-dimensional accelerometer implemented in hardware in the form of an accelerometer chip. In some embodiments, the accelerometer **232** is a six axis accelerometer implemented in hardware in the form of an accelerometer chip. The accelerometer **232** can track motion stats and shots fired. Accelerometer information, such as shots fired, can be shared with the other connected devices. The IR sensor **246** can detect the long range infrared band and can be used for thermal imaging and can detect if a person is looking through the red dot.

Rangefinder

[0061] FIG. **4** depicts a system architecture for electronic circuitry in a connected ranging device **300**, such as a laser rangefinder, according to one or more embodiments of the disclosure. The electronic circuitry of the rangefinder **300** includes a processor **302**, power supply **301**, a memory **304**, network adaptor **306**, input/output (I/O) interface **308**, display **310**, and a bus **312** that communicatively couples various system components. Rangefinder **300** includes a laser **316** and receiver **318** in order to determine the calculated range to the target. In some embodiments, specialized database **314** is provided including maps, topographic information, ballistics data and other data files stored in memory **304**. I/O interface **308** facilitates communication with input and output devices for interacting with a user, such as a user-input device **314** and/or an external display **312**, which enable a user to interact directly with the rangefinder **300**. User-input device **314** may comprise one or more push buttons, a touch screen, or other devices that allows a user to input information. External display **312** may comprise any of a variety of visual displays, such as a viewable screen, a set of viewable symbols or numbers, and so on. Unless described below, the components of connected device **300** are substantially the same as those of connected device **100**.

[0062] In some embodiments, the rangefinder **300** includes a plurality of sensors in communication with the processor **302** via the bus **312** or other interfaces. In one configuration the rangefinder **300** may include a GPS sensor **330**, a compass **334**, a pressure sensor **337**, a temperature sensor **338**, a wind sensor **340**, a rotational position sensor **342**, an image sensor **344**, and a proximity sensor **348**. The sensors may be disposed within the housing or proximate to the rangefinder housing, or alternatively, may be disposed in a separate housing proximate to the housing of the rangefinder **300**.

[0063] The GPS sensor **330** can be used to determine the location of the rangefinder **300** for waypoint setting by correlating the position to a map stored in the database **314**, or for geofencing, such that a visual, audible or haptic alert is provided when the calculated location is entering or exiting a predetermined geofence.

[0064] The compass **334** provides the heading of the rangefinder **300**. The heading information can be used in conjunction with the GPS sensor **330** and the calculated range to direct the user to the target location. In some embodiments, the information can be shared with the connected riflescope **100** to direct the user to the target.

[0065] A pressure sensor **337** and temperature sensor **338** are implemented on connected device **300**. The pressure sensor **337** can be used to detection ambient pressure as well as historical changes in pressure. The temperature sensor **338**. The temperature sensor **338** can be used to detect ambient temperature including detection of historical changes in temperature.

[0066] A wind sensor **340** is provided on the connected device **300** to provide information related to the wind speed and direction. The wind sensor **340** can also obtain wind conditions by accessing weather stations via the network adapter **306**.

[0067] One or more rotational position sensors **342** is provided on the control knobs of the rangefinder **300**. A rotational position signal is provided from the rotational position sensor **342** via the bus **312** to the processor **302**. For example, the connected device may provide information regarding focus of the rangefinder. The image sensor **344** can provide still images or video of the view visible from the eyepiece such as the reticle, surroundings and the target. The proximity sensor **348** can be used to detect if a person is looking through the scope. The information obtained from the sensors can be shared with other connected devices in the local connected network.

Binoculars

[0068] FIG. **5** depicts a system architecture for electronic circuitry in a connected device **400**, such as binoculars, and in particular rangefinder binoculars, according to one or more embodiments of the disclosure. The electronic circuitry of the connected device **400** includes a processor **402**, power supply **401**, a memory **404**, network adaptor **406**, input/output (I/O) interface **408**, reticle display **410**, and a bus **412** that communicatively couples various system components. Binoculars **400** optionally include a laser **416** and receiver **418** in order to determine the calculated range to the target. I/O interface **408** facilitates communication with input and output devices for interacting with a user. For example, I/O interface **408** can communicate with one or more devices such, as a user-input device **414**, which enable a user to interact directly with the binoculars **400**. User-input device **414** may comprise one or more push-buttons, a touch screen, or other devices that allows a user to input information. Unless described below, the components of binocular **400** are substantially the same as those of connected device **100**.

[0069] In some embodiments, binoculars **400** includes a plurality of sensors in communication with the processor **402** via the bus **412** or other interfaces. In one configuration, the binoculars **400** may include a GPS sensor **430**, an accelerometer **432**, a compass **434**, a wind sensor **440**, a rotational position sensor **442**, and image sensor **444**, and a proximity sensor **448**. The sensors may be disposed within the housing or proximate to the housing of the binoculars **400**, or alternatively, may be disposed in a separate housing proximate to the housing.

[0070] As with the rangefinder **300**, the GPS sensor **430** can be used to determine the location of the binoculars **400** for waypoint setting by correlating the position to a map stored in the database **414**, or for geofencing, such that a visual, audible or haptic alert is provided when the calculated location is entering or exiting a predetermined geofence. In some embodiments, the GPS location information is shared with other connected devices in the local connected network. The compass **434** provides the heading of the binoculars **400**. The heading information can be used in conjunction with the GPS sensor **430** and the calculated range to direct the user to the target location. In some embodiments, the information can be shared with the connected riflescope **100** to direct the user to the target. The accelerometer **432** provides data regarding binocular cant and tilt.

[0071] A wind sensor **440** is provided on the connected device **400** to provide information related to the wind speed and direction. The wind sensor **440** can also obtain wind conditions by accessing weather stations via the network adapter **406**.

[0072] One or more rotational position sensors **442** is provided on the control knobs of the binoculars **400**. A rotational position signal is provided from the rotational position sensor **442** via the bus **412** to the processor **402**. For example, the connected device may provide information regarding focus or magnification of the binoculars.

[0073] The image sensor **444** can provide still images or video of the view visible from the eyepiece such as the reticle, surroundings and the target. The proximity sensor **448** can be used to detect if a person is looking through the eyepiece of the binoculars **400**. The information obtained from the sensors can be shared with other connected devices in the local connected network.

Spotting Scope

[0074] FIG. **6** depicts a system architecture for electronic circuitry in a connected device **500**, such as a spotting scope, according to one or more embodiments of the disclosure. The electronic circuitry of the connected device **500** includes a processor **502**, power supply **501**, a memory **504**, network adaptor **506**, input/output (I/O) interface **508**, reticle display **510**, and a bus **512** that communicatively couples various system components. I/O interface **508** facilitates communication with input and output devices for interacting with a user, such as a user-input device **514**, which enable a user to interact directly with the spotting scope. User-input device **514** may comprise one or more push buttons, knobs, a touch screen, or other devices that allows a user to input information. Unless described below, the components of spotting scope **500** are substantially the same as those of connected device **100**.

[0075] In some embodiments, spotting scope **500** includes a plurality of sensors in communication with the processor **502** via the bus **512** or other interfaces to provide information, In one configuration the spotting scope **500** may include a GPS sensor **530**, an accelerometer **532**, a compass **534**, a wind sensor **540**, and image sensor **544**, and a proximity sensor **548**. The sensors may be disposed within the housing or proximate to the housing of the spotting scope **500**, or alternatively, may be disposed in a separate housing proximate to the housing.

[0076] As with the rangefinder **300**, the GPS sensor **530** can be used to determine the location of the spotting scope **500** for waypoint setting by correlating the position to a map stored in the database **514**, or for geofencing, such that a visual, audible or haptic alert is provided when the calculated location is entering or exiting a predetermined geofence. In some embodiments, the GPS location information is shared with other connected devices in the local connected network.

[0077] The compass **534** provides the heading of the spotting scope **500**. The heading information can be used in conjunction with the GPS sensor **530** and the calculated range to direct the user to the target location. In some embodiments, the information can be shared with the connected riflescope **100** to direct the user to the target. The accelerometer **532** provides data regarding scope cant and tilt.

[0078] A wind sensor **540** is provided on the connected scope **500** to provide information related to the wind speed and direction. The wind sensor **540** can also obtain wind conditions by accessing weather stations via the network adapter **506**.

[0079] One or more rotational position sensors **542** is provided on the control knobs of the scope **500**. A rotational position signal is provided from the rotational position sensor **542** via the bus **512** to the processor **502**. For example, the connected device may provide information regarding focus or magnification of the scope.

[0080] The image sensor **544** can provide still images or video of the view visible from the eyepiece such as the reticle, surroundings and the target. The proximity sensor **548** can be used to detect if a person is looking through the eyepiece of the scope **500**. The information obtained from the sensors can be shared with other connected devices in the local connected network.

Watch

[0081] FIG. **7** depicts a system architecture for electronic circuitry in a connected device **600**, such as a user-centered watch or wrist-worn device, according to one or more embodiments of the disclosure. The connected device **600** includes a housing and a strap. In some embodiments, the housing can be placed on and/or coupled to a firearm or scope to provide further metrics about the firearm or scope. The electronic circuitry of the connected device **600** includes a processor **602**, power supply **601**, a memory **604**, network adaptor **606**, input/output (I/O) interface **608**, watch display **610**, and a bus **612** that communicatively couples various system components. I/O interface **608** facilitates communication with input and output devices for interacting with a user. For example, I/O interface **608** can communicate with one or more devices such, as a user-input device **614**, which enable a user to interact directly with the watch **600**. User-input device **614** may comprise one or more push-buttons, knobs, or other devices that allows a user to input information. Unless described below, the components of connected watch **600** are substantially the same as those of connected device **100**.

[0082] In some embodiments, watch **600** includes a plurality of sensors in communication with the processor **602** via the bus **612** or other interfaces to provide information used by the watch **600** and other connected devices in the local connected network. In one configuration the watch **600** may include a GPS sensor **630**, an accelerometer **632**, a compass **634**, pressure sensor **637**, temperature **638** and a wind sensor **640**. The sensors may be disposed within the watch housing or alternatively, disposed in a separate housing proximate to the watch housing.

[0083] The GPS sensor **630** can be used to determine the location of the watch **600** for waypoint setting by correlating the position to a map stored in the database **614**, or for geofencing, such that a visual, audible or haptic alert is provided when the calculated location is entering or exiting a predetermined geofence. In some embodiments, the GPS location information is shared with other connected devices in the local connected network. The GPS location of the watch **600** can be correlated into a map displayed on the watch display **610** along with the location of other connected devices in the local connected network.

[0084] The accelerometer **632** provides data regarding scope cant for an associated scope. For example, the housing of watch **600** can be placed on or affixed to a firearm or scope to detect the angle of the firearm or scope to one side or the other. For example, when viewing through the riflescope, the cant angle will describe whether the horizontal crosswire is level. When placed on or coupled to the firearm or scope, the accelerometer **632** provides data regarding tilt, i.e., when the firearm or scope is aimed uphill or downhill such that the eyepiece is higher or lower than the objective/barrel side. When coupled to a firearm or scope, the accelerometer **632** further provides data regarding recoil of the firearm, which can be used to detect shots fired by the firearm attached to the connected device **600**.

[0085] The compass **634** provides the heading of the watch **600**. The heading information can be used in conjunction with the GPS sensor **630** and the calculated range to direct the user for orienteering. In some embodiments, the information can be shared with a connected riflescope **100** to direct the user to a target.

[0086] In some embodiments, the connected device **600** incorporates weather information such as altitude, temperature and pressure data, along with animal sightings to predict animal movements. Connected device **600** can include pressure sensor **637** to provide barometric elevation and store historical elevation information in memory **604**. Temperature sensor **638** can be used to detect ambient temperature. A wind sensor **640**, such as an ultrasonic wind meter can be connected to connected device **600** via a wireless connection to provide information related to the wind speed via the network adapter **606**. The pressure, temperature and wind information can be supplied to an animal model stored on specialized database **614** to predict animal movements.

Trail Camera

[0087] FIG. **8** depicts a system architecture for electronic circuitry in a connected device **700**, such as a trail camera, according to one or more embodiments of the disclosure. The electronic circuitry of the connected device **700** includes a processor **702**, power supply **701**, a memory **704**, network adaptor **706**, input/output (I/O) interface **708**, display **710**, and a bus **712** that communicatively couples various system components. The I/O interface **708** facilitates communication with input and output devices for interacting with a user, such as a user-input device **714**, which enable a user to interact directly with the trail camera **700**. User-input device **714** may comprise one or more push buttons, knobs, or other devices that allows a user to input information.

[0088] In some embodiments, trail camera **700** includes a plurality of sensors in communication with the processor **702** via the bus **712** or other interfaces to provide information used by the trail camera **700** and other connected devices in the local connected network. In one configuration the trail camera **700** may include a GPS sensor **730**, compass **734**, pressure sensor **737**, temperature **738** and a wind sensor **640**. The sensors may be disposed within the housing or alternatively, disposed in a separate housing proximate to the trail camera housing.

[0089] The GPS sensor **730** can be used to determine the location of the trail camera **700**. The GPS location of the trail camera **700** can be correlated into a map for display on a display **710** and/or forwarded to other connected devices in the local connected network. A pressure sensor **737** is provided on the connected device to provide ambient pressure as well as barometric altitude. A temperature sensor **738** provides information related to ambient temperature.

[0090] The image sensor **744**, can be used in connection a with a proximity sensor **746** and IR sensor **748** to provide still images or video of animals that move in front of the connected device **700**. The specialized database **714** may include data to categorize the images obtained by the trail camera and identify animal species. The captured images and video from the image sensor **744**, along with species identification, and weather metrics can be shared with other connected devices on the local connected network.

Connected Device

[0091] FIG. **9** depicts a system architecture for electronic circuitry in a connected device **800**, such as a connected projectile or arrow, a tracking tag, a set of headphones or earbuds, speakers, a chronograph, lights, tents, blinds, an augmented reality (AR) system, night vision scope, ammunition powder measuring devices, firearm, magazine, bag, carrying case, luggage, according to one or more embodiments of the disclosure. The electronic circuitry of the connected device **800** includes a processor **802**, power supply **801**, a memory **804**, network adaptor **806**, input/output (I/O) interface **808**, and a bus **812** that communicatively couples various system components. In some embodiments, connected device includes user inputs **814**, e.g., to set device operating parameters and one or more display components **810**, e.g., to indicate component settings or status.

[0092] In some embodiments, the connected device **800** includes a plurality of sensors in communication with the processor **802** via the bus **812** or other interfaces. In one configuration the connected device **800** may include a GPS sensor **830**, an accelerometer **832** and compass **834**. The sensors may be disposed within the housing of the connected device **600**.

Anemometer

[0093] In another embodiment, the connected device **900** is anemometer, rain gauge or other weather station, shown in FIG. **10**. The electronic circuitry of the connected device **900** includes a processor **902**, a memory **904**, network adaptor **906**, input/output (I/O) interface **908**, and a bus **912** that communicatively couples various system components. Processor **902**, memory **904**, network adapter **906**, bus **912** and I/O interface **908** are substantially similar as those described in riflescope **100**.

[0094] In some embodiments, the connected device **900** includes a plurality of sensors in communication with the processor **902** via the bus **912** or other interfaces to provide information. In one configuration the connected device **900** may include a GPS sensor **930**, pressure sensor **937**, temperature sensor **938**, wind sensor (speed and direction) **940**, relative humidity **950**, and rainfall sensor **952**. The sensors may be disposed within the housing of the connected device **900** or adjacent to the housing.

[0095] In one or more embodiments, the program instructions of the computer program product are configured as an "App" or application executable on a user-centered connected device, such as a mobile phone, laptop computer, tablet, watch **600** or other suitable computer utilizing a general-purpose operating system. The App may be installed on the user-centered connected device **40** or optionally on any of the connected devices on the local connected network. The App provides a number of centralized operations for coordinating the data gathering from the connected devices and analysis of the data.

[0096] The App establishes a user account associated with the local connected network. The user account includes a user profile that stores relevant information about the activities of the user. For hunting excursions, the user profile may include firearms used, types of magazines and ammunition. The user profile may identify connected devices associated with the user.

[0097] The App provides a user interface for establishing the computer communication between the connected devices on the local connected network. Typically, the devices are connected by a wireless connection. The App enables the user to link each device to the account. When the connected devices are linked, such devices may connected to the user-centered device **40** or they may be connected to other connected devices without the need for connection to the user-centered device.

[0098] The App can provide information about the network and the various devices. For example, the App can provide a map of the local area and identify each connected device on the map. Such action can be facilitated by the GPS sensor and maps stored on each of the devices. The App can provide information on device status, e.g., whether a device is active, which can be provided in response to a request by the user or by periodic signals provided by each connected device. "Last known" status for each device is stored and time-stamped for reference. In some embodiments, the information is provided to the user in distributed fashion as needed. For example, a display on the handheld device can be used to show the location and status of connected devices on the network. In some embodiments, the display may be provided on a selected device regarding the status of another selected device. A riflescope may provide a visual indication that a rangefinder is connected and active.

[0099] The App can post various point of information to social media platforms. For example, the user may select and option to post the geographic location of various connected devices on social media. The user may choose to post various photographs or video obtained from the connected devices depicting wildlife, landscapes, targets etc. The user may choose to post weather conditions, such as sudden or significant weather conditions obtained from the connected device sensors. The user may choose to post statistics from an excursion such as the range of a deployed arrow or the distance and time for a hike. Since the data is gathered and accumulated centrally, the App can access and disseminate such information to social media as selected by the user.

[0100] FIGS. **2-10** are only examples of suitable connected devices and are not intended to suggest any limitation as to the scope of use or functionality of the embodiments described herein. Regardless, the depicted system architecture is capable of being implemented and/or performing the functionality as set forth herein.

[0101] The local connected network can provide confirmation of user settings, such as focus confirmation. When the scope **100** is connected to the local connected network with another connected device, the data received from the connected devices may be shared. Another connected device on the network may be a ranging device such as a laser rangefinder **300** or binocular **400** with ranging features described herein that determines the distance to a target, e.g., the "calculated distance". The calculated distance data from the rangefinder **300** or binoculars **400** is transferred to the scope **100** and is displayed on the reticle display **110**. During adjustment of the scope **100**, the selected distance is associated with a particular knob position and is detected by the rotational position sensor **142**. The calculated distance and the selected distance are compared, e.g., by the processor **102**, and an alert is provided by a notification device when the calculated distance matches the selected distance. In some embodiments, a match occurs when the calculated distance is substantially the same as the selected distance, e.g., within 10%, 5%, 1%. The notification device may be the reticle display and the alert may be provided visually on the reticle display **110**, external display **112** or audible or haptic signals to the user via speaker unit/haptic feedback unit **115**. For example, the displayed colors on reticle display **110** may be shown in the color green. In some embodiments, the alert may be provided by a third connected device, e.g., the haptic feedback unit provide a vibratory alert on the watch **600** via the haptic feedback unit **615**.

[0102] The local connected network can track shots fired and locate the target location, e.g., the destination of a bullet or arrow fired, and direct the user to such location. The scope **100** or red dot sight **200** accesses information from the user profile regarding the type of firearm, magazine and ammo to determine a loaded ammunition count. The scope **100** or red dot sight can display the fully loaded ammunition count and the current ammunition count by "counting down" the ammunition as shots are fired and detected. For example, detection of shots fired is determined by the accelerometers **132**, **232**, **632** provided on the scope **100**, the red dot sight **200** and the watch **600**. When the current ammunition count is reduced to a predetermined threshold, the display of the scope **100** or red dot sight **200** provides an alert regarding "Low ammo" or to "reload."

[0103] Once the shot is fired, the expected location of bullet or the arrow is determined and mapped to allow the user to travel to location of the destination, e.g., to retrieve or observe the target. Various inputs can be aggregated in order to best predict the location, including ballistics information stored in the user profile or detected on the magazine, scope/rangefinder information, current GPS, and compass metrics. If an arrow is used, it may include an embedded tracking tag **800** that includes GPS information. Finally, the user-centered device or watch **600** may receive the destination location above and map such location on a local area map that displays the user's current location (obtained by GPS sensor) and the destination location. Further, the user may be provided with "turn-by-turn" directions to the detected spot by reliance on GPS and the compass to identify the current heading.

[0104] The local connected network can locate a target and direct the user to such location. A rangefinder **300** or a spotting scope **500**—with or without laser rangefinding capability—can identify a target, communicate that target to a scope **100**. The scope **100** can provide navigation details to allow a user to move to the target. For example, the display **110** may include "left" and "right" arrows and may also visually highlight the target with a bright or colored outline. The rangefinder **300** or scope **500** use laser rangefinder or similar technology to pinpoint the location of the target, along with GPS and/or heading information. The spotting scope **500** communicates the target's relative location and the spotter scope location. A display on the scope **100**, watch **600** or phone **40** can superimpose the target's relative location and the spotter scope location (as a proxy for the user's location) onto a map.

[0105] The local connected network can provide status or information of the connected devices. First, the location of each connected device as obtained by the GPS sensor is periodically saved. A map of the local area is generated with each connected device on the map. Location information can be obtained in response to a request by the user or by periodic signals provided by each connected device. Second, sensor data can be obtained from the connected devices. The user may use a user-centered device such as the phone and/or watch to select which windage device to read from, including selecting from a map showing the location of windage devices. The user-centered device may be used to view the location of each trail camera and select to view live and/or view past footage. The user-centered device may be used to view the location blinds, tree stands or rain gauges having a connected target tracking device **800**.

[0106] The local connected network can extend the user interface capabilities of the connected devices. The display of the user-centered device such as the watch and or phone may be used to display additional information from a scope or rangefinder (beyond the information displayed on its own display devices) or to control the reticle display of the scope of rangefinder, including what information is visible. For example, the display screen on the user-centered device can be used to display raw rangefinder data. The user-centered device can be used to cycle through the mode of operation of the rangefinder. The user-centered device can be used to select the reticle design being used, as well as the location of information, color, size, etc. The reticle may be selected via user inputs on the user-centered device to view wind speed and to select a particular connected device with a wind sensor from a series of potential wind devices. Selection may be based on a map view of wind devices in the field. The user-centered device can be used to set a timer on scope for a shot clock.

[0107] The local connected network can provide improved accuracy of ballistics data. A connected chronograph provides data relating to bullet and reloading devices, e.g., magazine loaders, provide can sync to provide specific ballistics info. A connected bullet box can be scanned to instantly load ballistic profile information to the user profile.

[0108] The local connected network can administer a multi-user hunt or other excursion group. Two or more users, each with a user account, can be added to form a group on a single local connected network. Each user can select a connected device having a GPS sensor, such as a scope **100**, phone **40** or watch **600** as a proxy for that user's location. A map is generated that shows the location of each user. Such map is available for display by the user's device. Additional users can be added, and their locations are added to the map. For a group hunt, additional safety measures can be provided. The connected device can be a scope **100** which provides directional information via the compass to indicate the direction of the barrel as a proxy for the direction the user is aiming the firearm. As a result, a warning can be provided to users when one user's riflescope is pointed in direction of another user on the hunt. In some embodiments, the location and heading of a first user with a firearm is compared to the location of a second user. If it is determined that the location and the heading of the first user is directed towards, e.g., intercepts, the location of the second user, the alert will be provided. The accelerometer can detect shots fired, and provide a notification for other users, including the location, direction and expected location of the shot. The connected devices can facilitate geo-fencing by superimposing user locations onto boundary lines in the local area. Alerts can be provided to users to help ensure boundary lines are not crossed while hunting. The historical data can be aggregated to provide a full map of the hunting day to show the movement of all users, the locations of all shots fired, and the location of all targets. Further metrics such as the time of day, weather conditions, ammunition used, and species of wildlife can be included in such maps.

[0109] The local connected network can administer a campsite. Connected devices are all capable of remote activation, such as water heaters, lights, speakers, etc. Remote activation can be done by selection on the display of a phone or watch or by voice activation with a microphone on the phone or watch. Activation of the devices can on a timer, e.g., automatically warming water in the morning, providing an alert/reminder to charge devices at night, etc. Voice control or time can turn lights or other devices off to save energy when leaving the camp for an extended period.

[0110] One or more embodiments may be a computer program product. The computer program product may include a computer readable storage medium (or media) including computer readable program instructions for causing a processor to configure a local connected network of connected devices according to one or more embodiments described herein. For example, as described above, in one or more embodiments the operations of the various methods and embodiments described above are elements of a computer program product, included as program instructions that are embodied in a computer readable storage medium. The computer readable storage medium is a tangible device that can retain and store instructions for use by an instruction execution device. The computer readable storage medium may be, for example, an electronic storage device, a magnetic storage device, an optical storage device, or other suitable storage media.

[0111] A computer readable storage medium, as used herein, is not to be construed as being transitory signals per se, such as radio waves or other freely propagating electromagnetic waves, electromagnetic waves propagating through a waveguide or other transmission media (e.g., light pulses passing through a fiber-optic cable), or electrical signals transmitted through a wire.

[0112] Program instructions, as described herein, can be downloaded to respective computing/processing devices from a computer readable storage medium or to an external computer or external storage device via a network, for example, the Internet, a local area network, a wide area network and/or a wireless network. A network adapter card or network interface in each computing/processing device may receive computer readable program instructions from the network and forward the computer readable program instructions for storage in a computer readable storage medium within the respective computing/processing device.

[0113] Computer readable program instructions for carrying out one or more embodiments, as described herein, may be assembler instructions, instruction-set-architecture (ISA) instructions, machine instructions, machine dependent instructions, microcode, firmware instructions, state-setting data, or either source code or object code written in any combination of one or more programming languages, including an object oriented programming language such as Smalltalk, C++ or the like, and conventional procedural programming languages, such as the “C” programming language or similar programming languages.

[0114] The computer readable program instructions may execute entirely on a single computer, or partly on the single computer and partly on a remote computer. In some embodiments, the computer readable program instructions may execute entirely on the remote computer. In the latter scenario, the remote computer may be connected to the single computer through any type of network, including a local area network (LAN) or a wide area network (WAN), or public network.

[0115] One or more embodiments are described herein with reference to a flowchart illustrations and/or block diagrams of methods, systems, and computer program products for enhancing target intercept according to one or more of the embodiments described herein. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, may be implemented by computer readable program instructions.

[0116] These computer readable program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks. These computer readable program instructions may also be stored in a computer readable storage medium that can direct a computer, a programmable data processing apparatus, and/or other devices to function in a particular manner, such that the computer readable storage medium having instructions stored therein comprises an article of manufacture including instructions which implement aspects of the function/act specified in the flowchart and/or block diagram block or blocks.

[0117] The computer readable program instructions may also be loaded onto a computer, other programmable data processing apparatus, or other device to cause a series of operational steps to be performed on the computer, other programmable apparatus or other device to produce a computer implemented process, such that the instructions which execute on the computer, other programmable apparatus, or other device implement the functions/acts specified in the flowchart and/or block diagram block or blocks.

[0118] The descriptions of the various embodiments of the present disclosure have been presented for purposes of illustration, but are not intended to be exhaustive or limited to the embodiments disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the described embodiments. The terminology used herein was chosen to explain the principles of the embodiments, the practical application or technical improvement over technologies found in the marketplace, or to enable others of ordinary skill in the art to understand the embodiments disclosed herein.

Claims

1. A system comprising a first device and a second device connected by a computer connection; wherein the first device is associated with a firearm and an accelerometer for detecting a shot fired by the firearm toward a target location of the shot; a processor in computer connection to the first device, the second device and the accelerometer, wherein the processor is configured to provide a notification of the target location; determine when the shot was fired; determine the target location; determine a location of the first device when the shot is fired; determine a location of the second device when the shot is fired; determine instructions for directing one or more users to the target location from the location of the first device or from the location of the second device, or from the location of the first device and from the location of the second device.
2. The system of claim 1 wherein a first user is associated with the first device and a second user is associated with the second device; and the processor provides instructions to direct the first user to the target location from the location of the first device; and instructions to direct the second user to the target location from the location of the second device.
3. The system of claim 1 wherein the firearm comprises the accelerometer.
4. The system of claim 1 wherein the first device comprises an aiming device coupled to the firearm.
5. The system of claim 4 wherein the aiming device is a scope or a red-dot sight.
6. The system of claim 4 wherein the first device comprises at least one of a compass, a GPS device and a ranging sensor and the processor provides the notification of the target location, the notification comprising a heading from the aiming device to the target location, a distance from the aiming device to the target location or a combination of the heading and the distance from the aiming device to the target location.
7. The system of claim 4 wherein the aiming device comprises the accelerometer.
8. The system of claim 7 wherein the accelerometer is configured to determine one or more of cant and tilt of the aiming device.
9. The system of claim 1 wherein the processor is in computer communication with a database comprising data selected from the group consisting of maps, topographic information and ballistics data, one or more of a GPS sensor, compass, pressure sensor, temperature sensor, wind sensor, rotational position sensor, image sensor, or proximity sensor.
10. The system of claim 9 wherein an aiming notification comprises an indication that a heading and range of the shot toward the target coincides with the target location.
11. The system of claim 10 wherein the aiming notification comprises an indication that one or both of the heading and the range need to be adjusted to direct the shot to coincide with the target location.
12. The system of claim 11 wherein the range is adjusted based on one or more of tilt of the aiming device and ballistics data.
13. The system of claim 1 wherein the accelerometer is disposed on the first device wherein the first device is worn by a user associated with the first device.
14. The system of claim 1 wherein the second device comprises a mobile phone, watch, tablet, or laptop computer.
15. The system of claim 1 wherein the second device comprises a ranging device selected from a laser rangefinder, spotting scope or ranging binoculars.

16. The system of claim 15 wherein the second device determines the target location and communicates the target location to the first device.
17. The system of claim 15 wherein a navigation notification comprises instructions to direct a user associated with the first device to the target location from the location of the first device.
18. The system of claim 1 wherein the first device comprises a network adapter and the second device comprises a network adapter and the first device and the second device are connected, with a computer connection.
19. The system of claim 1 wherein the first device and the second device are connected by a wireless connection.
20. The system of claim 1 comprising one or more notification devices associated with the first device and the second device wherein the one or more notification devices comprise an optical display, speaker device or haptic device.