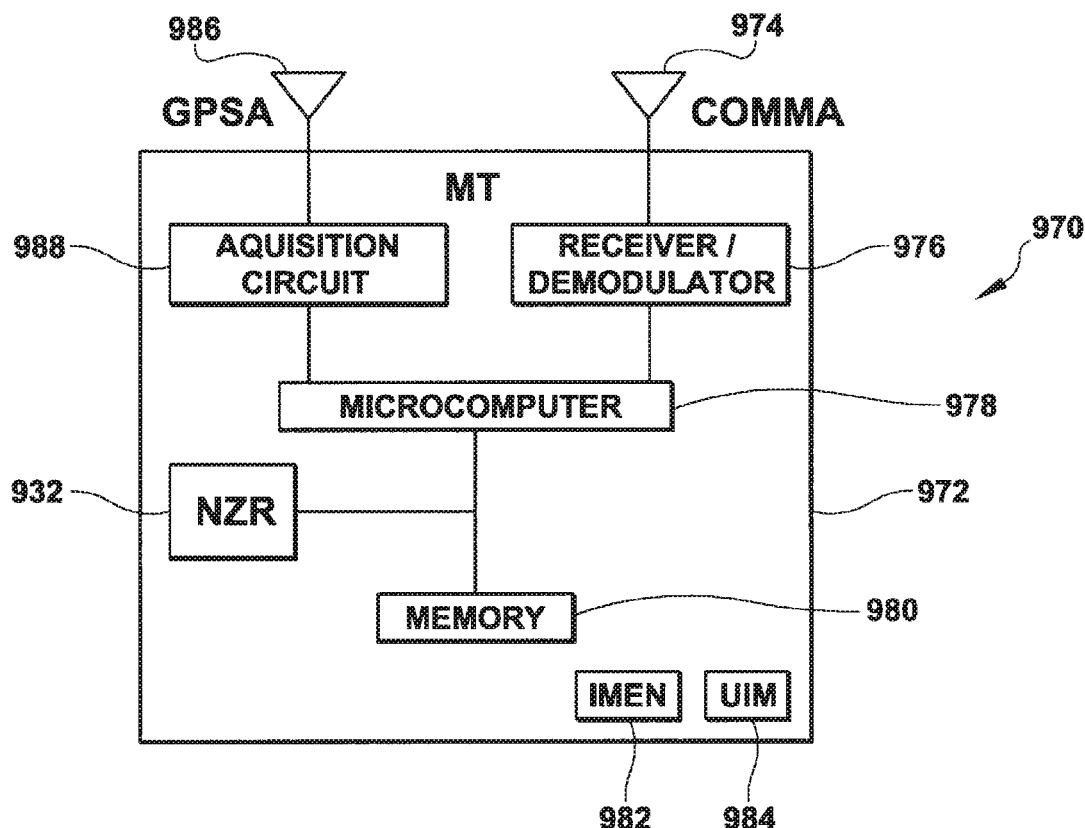




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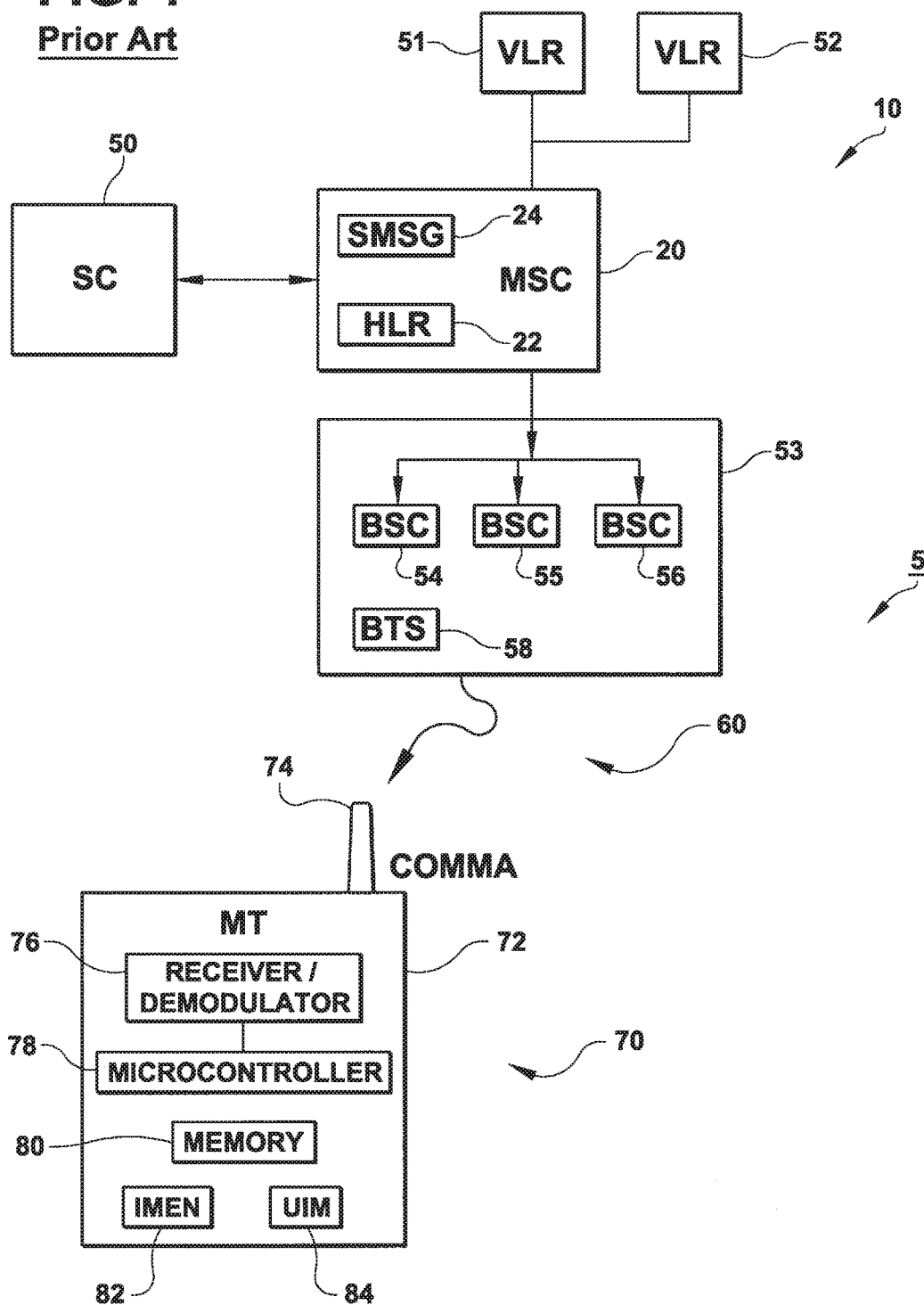
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**Juhasz et al.**(10) **Pub. No.: US 2018/0302839 A1**(43) **Pub. Date: Oct. 18, 2018**(54) **DEAD ZONE FOR WIRELESS DEVICE**(71) Applicants: **Paul R. Juhasz**, Houston, TX (US);  
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**Christopher Frerking**, Concord, NH  
(US); **James Tiernan**, Houston, TX  
(US)(21) Appl. No.: **15/986,339**(22) Filed: **May 22, 2018**(60) Provisional application No. 62/368,828, filed on Jul.  
29, 2016, provisional application No. 62/368,833,  
filed on Jul. 29, 2016, provisional application No.  
62/369,620, filed on Aug. 1, 2016, provisional appli-  
cation No. 61/195,016, filed on Oct. 2, 2008, provi-  
sional application No. 62/562,880, filed on Sep. 25,  
2017.**Publication Classification**(51) **Int. Cl.**  
**H04W 48/02** (2006.01)  
(52) **U.S. Cl.**  
CPC ..... **H04W 48/02** (2013.01); **H04W 4/02**  
(2013.01)**Related U.S. Application Data**(63) Continuation-in-part of application No. 15/663,660,  
filed on Jul. 28, 2017, which is a continuation-in-part  
of application No. 15/620,288, filed on Jun. 12, 2017,  
now Pat. No. 9,913,200, which is a continuation of  
application No. 13/462,712, filed on May 2, 2012,  
now Pat. No. 9,681,358, which is a continuation of  
application No. 12/571,090, filed on Sep. 30, 2009,  
now abandoned, Continuation-in-part of application  
No. 15/910,190, filed on Mar. 2, 2018.(57) **ABSTRACT**

A system comprising: a wireless device, the wireless device comprising a processor and a lower level system; and a wireless device subsystem electrically adapted to the wireless device, the wireless device subsystem configured to provide a control signal to the lower level system in response to a detected condition, the control signal modifying an operational performance of the lower level system.

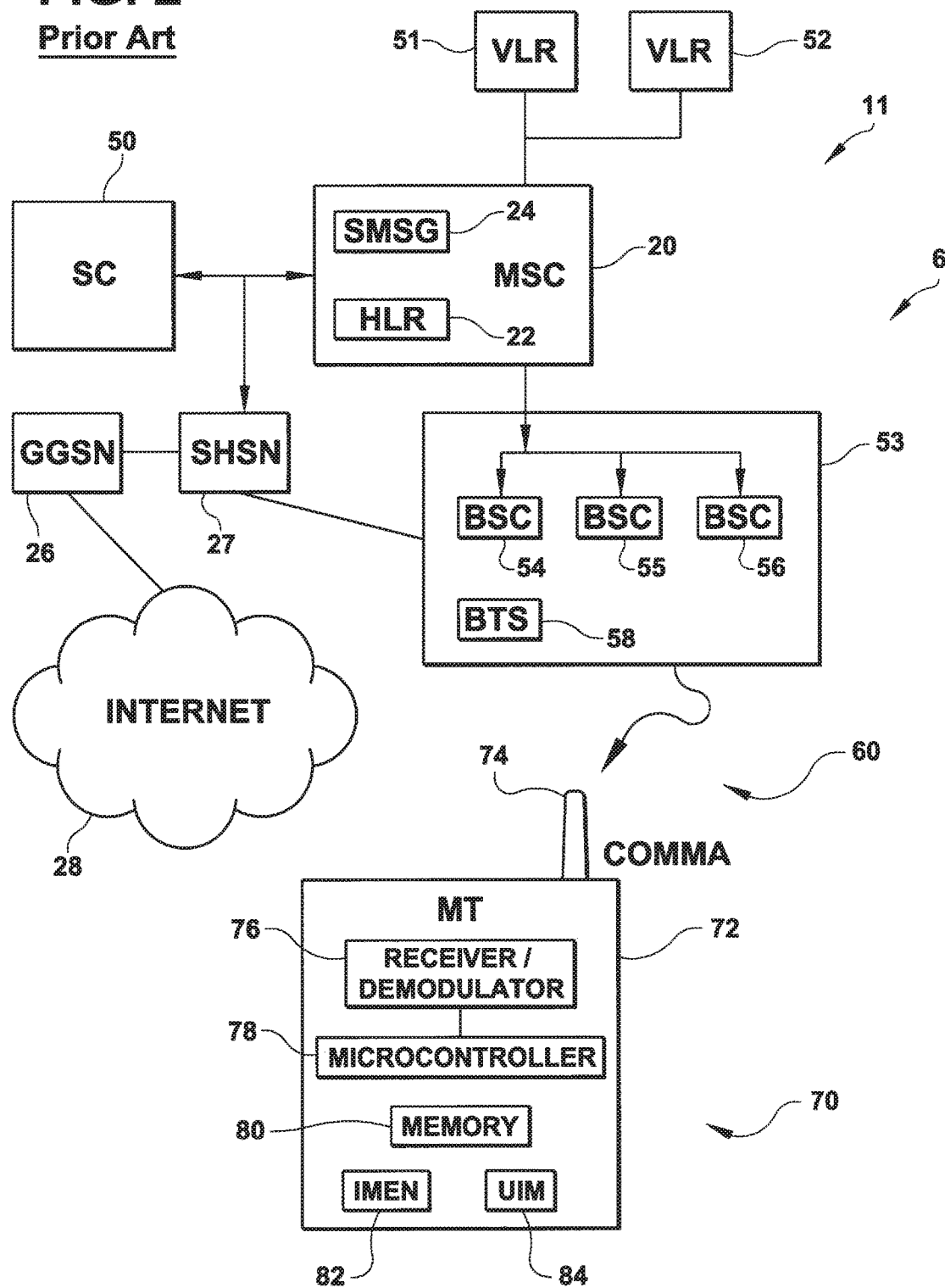


**FIG. 1**

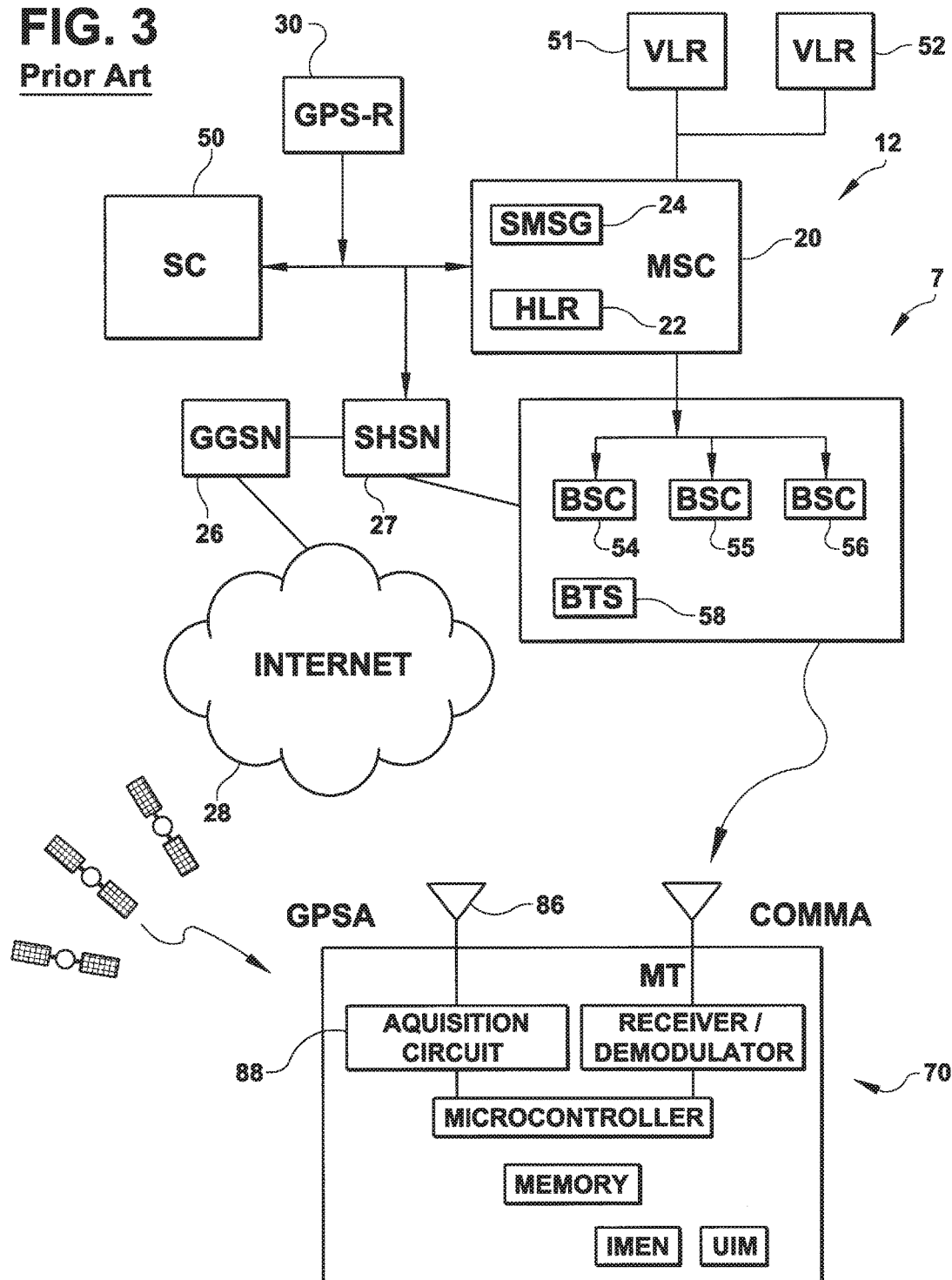
Prior Art



**FIG. 2**  
**Prior Art**



**FIG. 3**  
**Prior Art**



**FIG. 4**

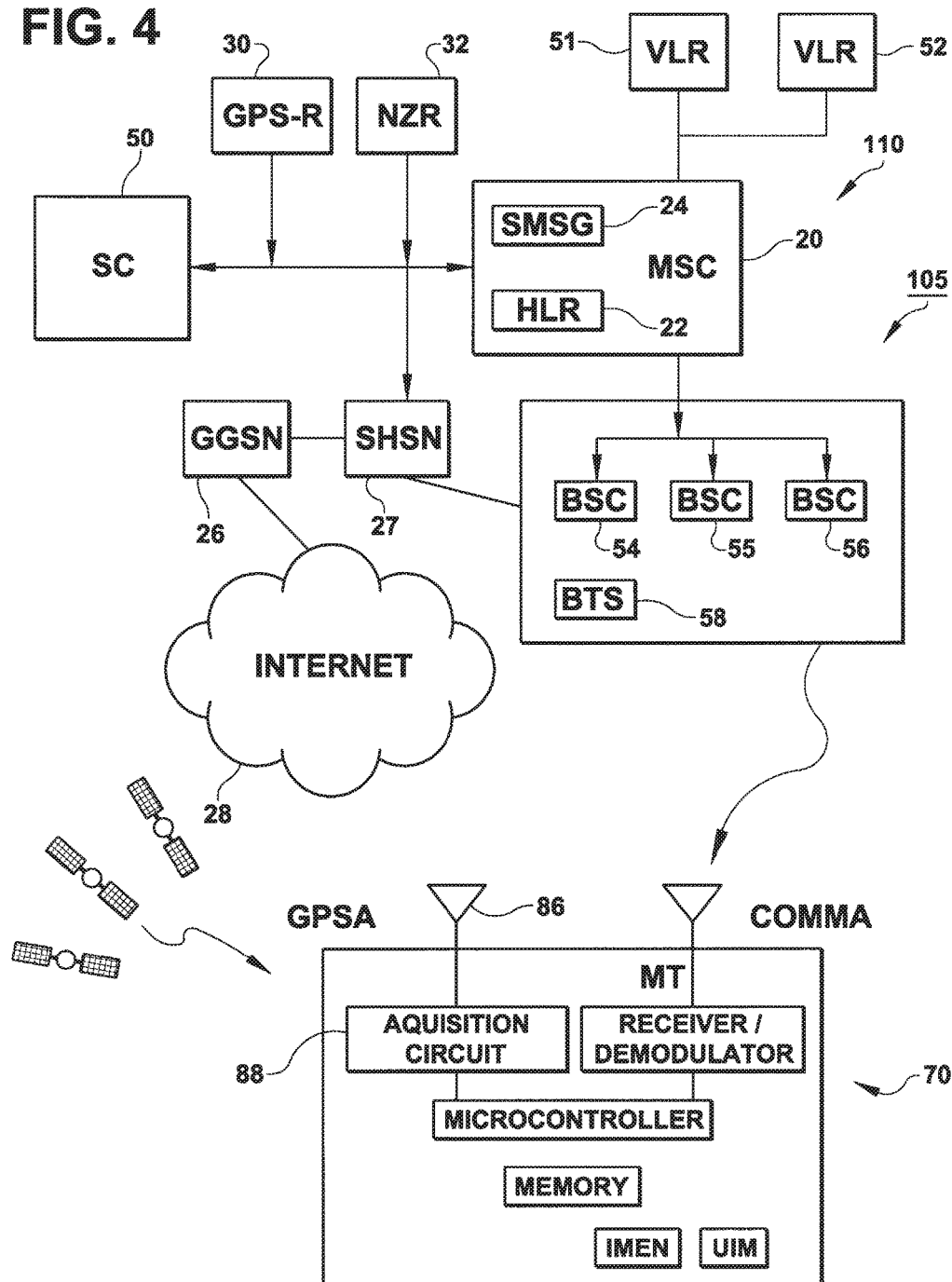
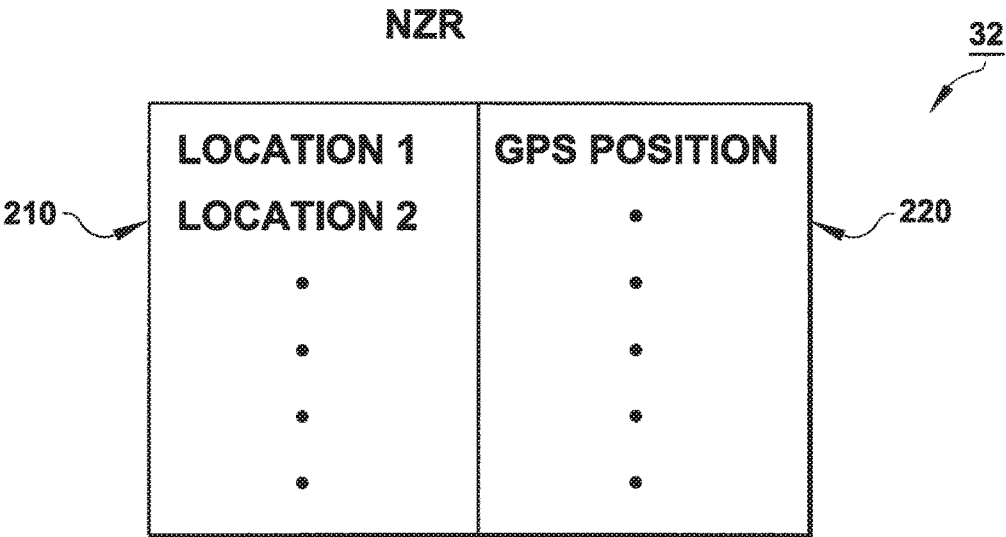


FIG. 5



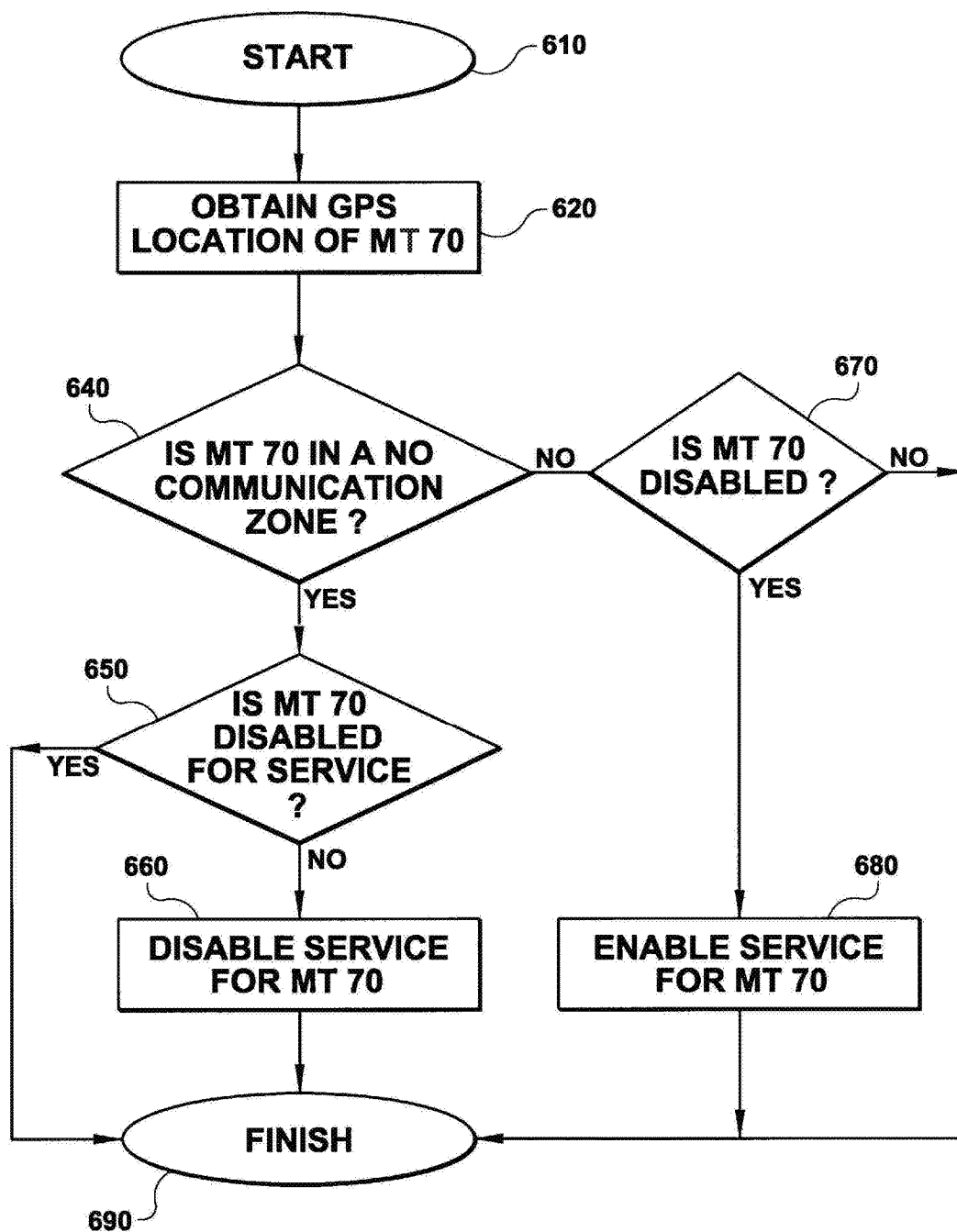
**FIG. 6**

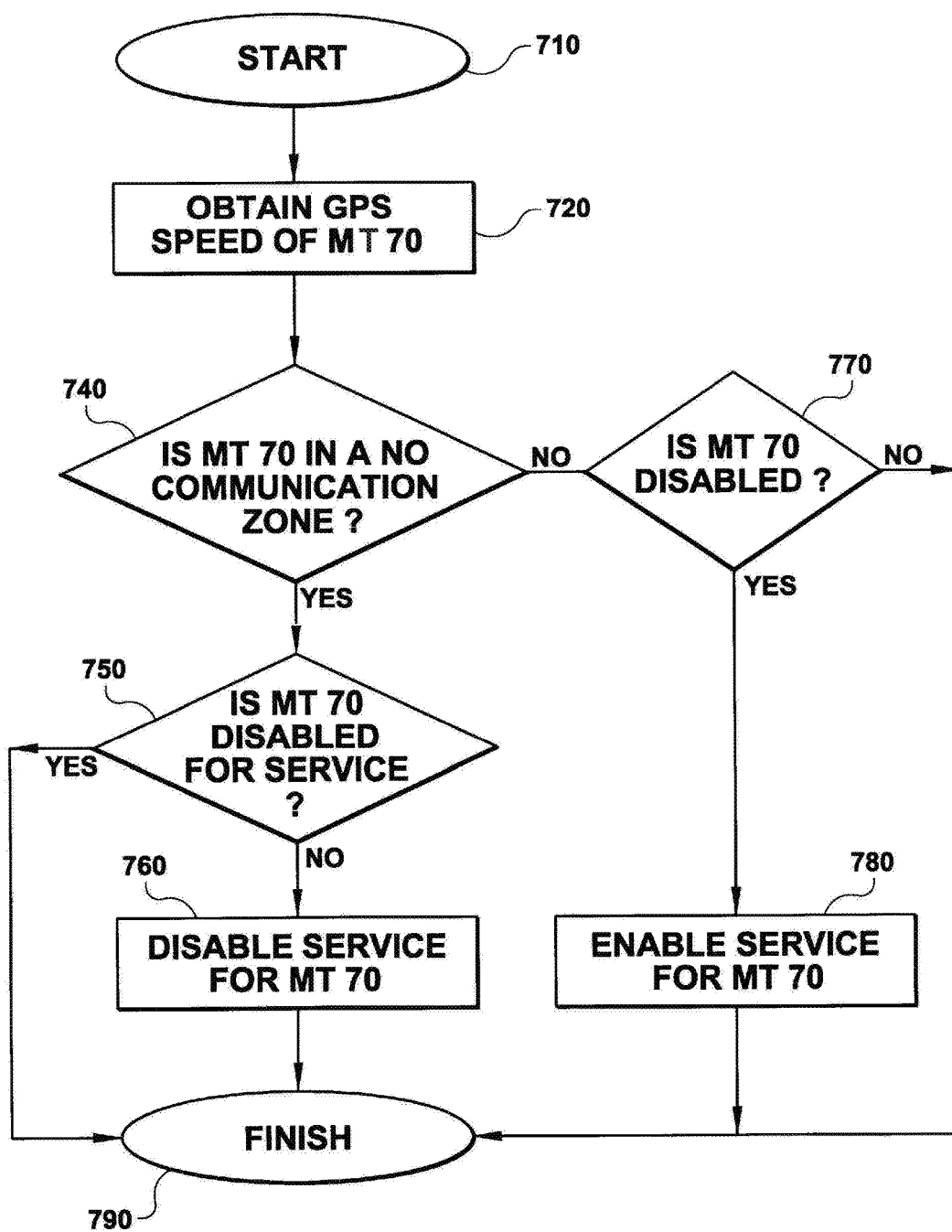
FIG. 7

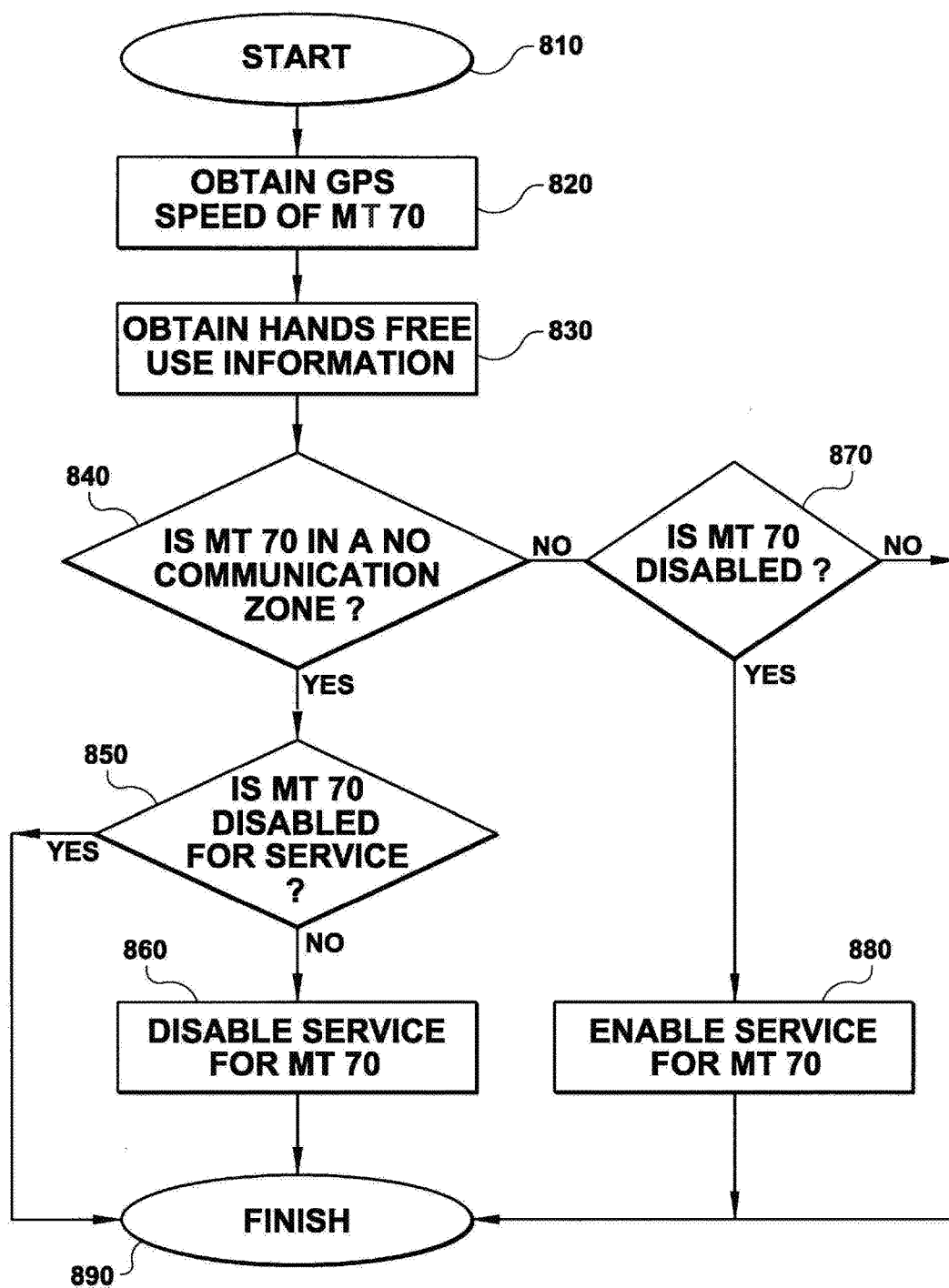
NZR

32

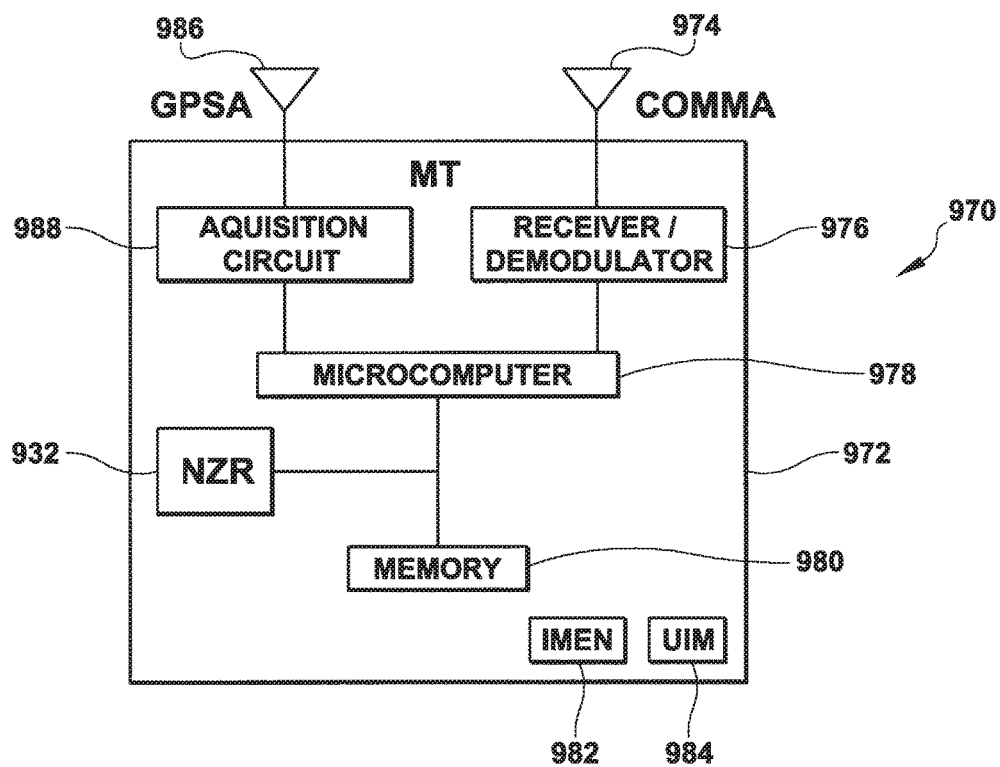
STATE 1	ALLOWABLE
STATE 2	NOT ALLOWABLE
•	•
•	•
•	•
•	•



**FIG. 8**

**FIG. 9**

**FIG. 10**



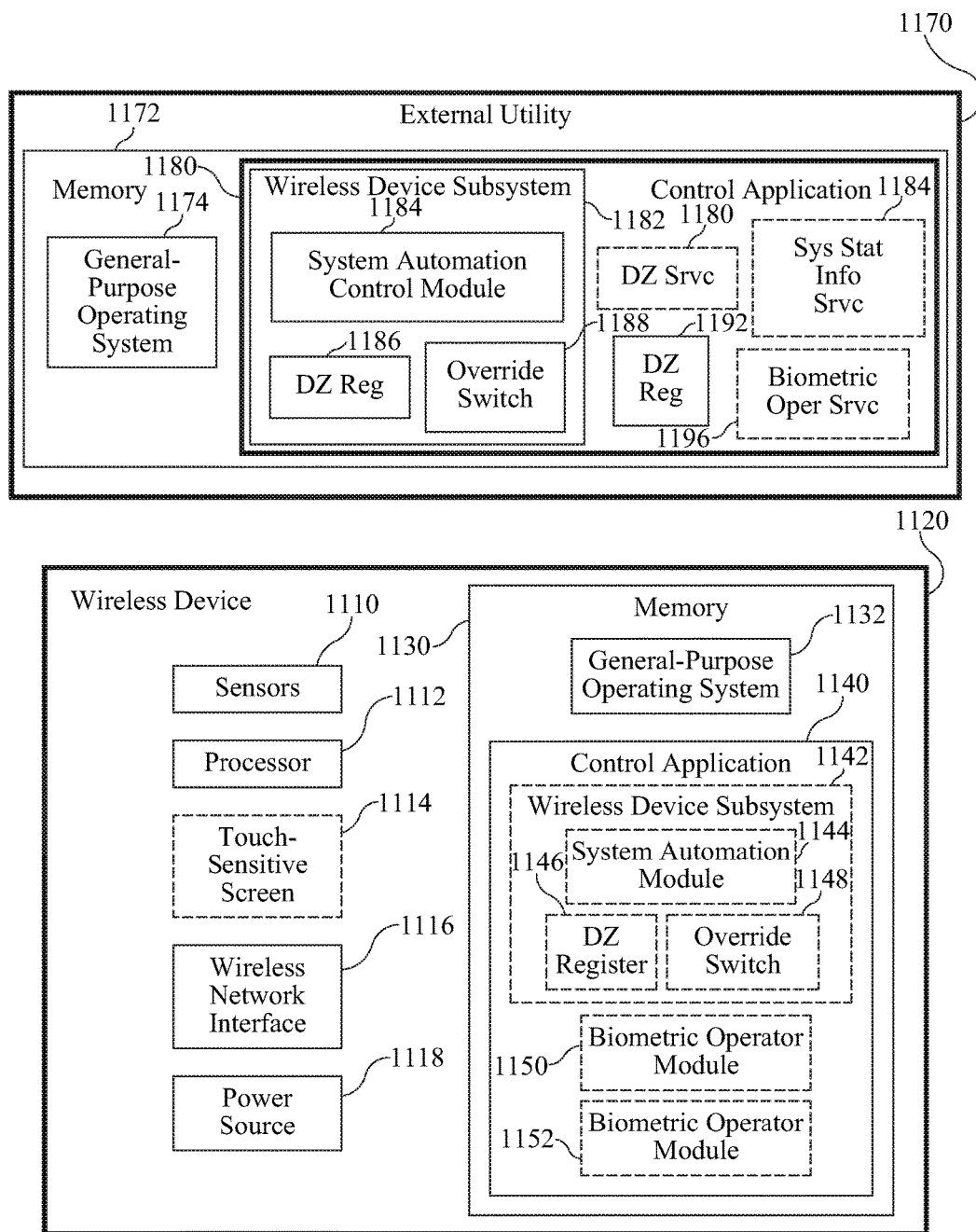


FIG. 11A

## TOUCH SENSITIVE SCREEN

## Dashboard on External Utility Controlled Functions

1123

Function	Enabled	Disabled	Modified	Script
Text messaging		X		Network Disabled
SMS messaging		X		Network Disabled
Email		X		Network Disabled
Camera	X			
Phone and contact address book	X			
Texting		X		Network Disabled
Video calling (Apple FaceTime)			X	Network Throttled down signal strength
Web browser			X	Throttled down signal strength
E-mail			X	Network Disabled
Weather	X			
Predictive typing (see predictive text). Voice dictation	X			

Function	Enabled	Disabled	Modified	Script
Voice-activated virtual assistant	X			
Siri, Google Voice Search and Cortana).	X			
Alarm clock, stopwatch, timer	X			
Calculator	X			
Calendar	X			
Note taker	X			
Music player	X			
Photo album	X			
Camera (still and video)	X			
GPS navigation			X	Network and Wireless Device Throttled down signal strength
App store search	X			

FIG. 11B-1

## TOUCH SENSITIVE SCREEN

## Dashboard on Wireless Device Controlled Functions

Function	Enabled	Disabled	Modified	Script
Text messaging	X			
SMS messaging	X			
Email	X			
Camera		X		
Phone and contact address book			X	
Texting	X			
Video calling (Apple FaceTime)	X			
Web browser	X			
E-mail	X			
Weather			X	
Predictive typing (see predictive text).			X	
Voice dictation			X	

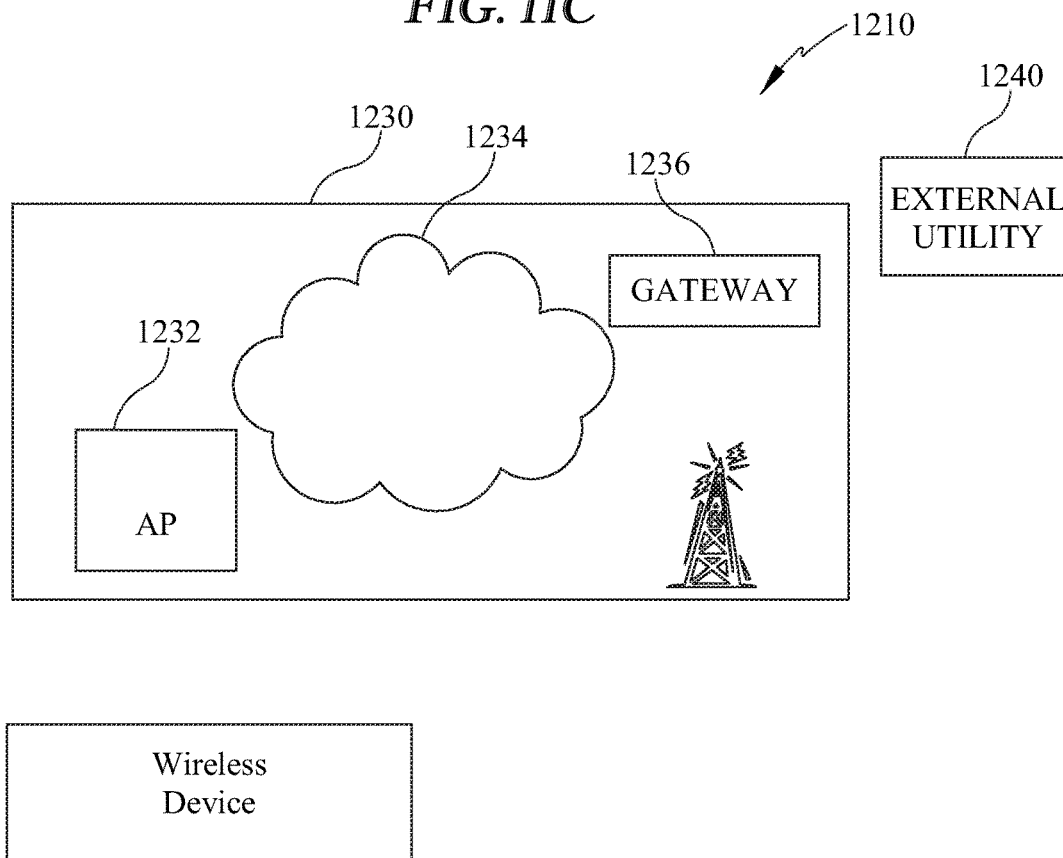
Function	Enabled	Disabled	Modified	Script
Voice-activated virtual assistant			X	Wireless Device Throttled down signal strength
Siri, Google Voice Search and Cortana)			X	Wireless Device Throttled down signal strength
Alarm clock, stopwatch, timer			X	Wireless Device Throttled down signal strength
Calculator			X	Wireless Device Throttled down signal strength
Calendar			X	Wireless Device Throttled down signal strength
Note taker			X	Wireless Device Throttled down signal strength
Music player			X	Wireless Device Throttled down signal strength
Photo album			X	Wireless Device Throttled down signal strength
Camera (still and video)		X		Network Disabled
GPS navigation			X	Network and Wireless Device Throttled down signal strength
App store search			X	Wireless Device Throttled down signal strength

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FIG. 11B-2

Wireless Device Enabled	Network Enabled	Wireless Device Disabled	Network Disabled	Wireless Device Modified	Network Modified	Output Enabled	Output Disabled	Output Modified
X	X					X		
X			X				X	
X					X			X
	X	X					X	
	X			X				X
		X	X				X	
		X			X		X	
			X	X			X	
				X	X			X

**FIG. 11C**



**FIG. 12**

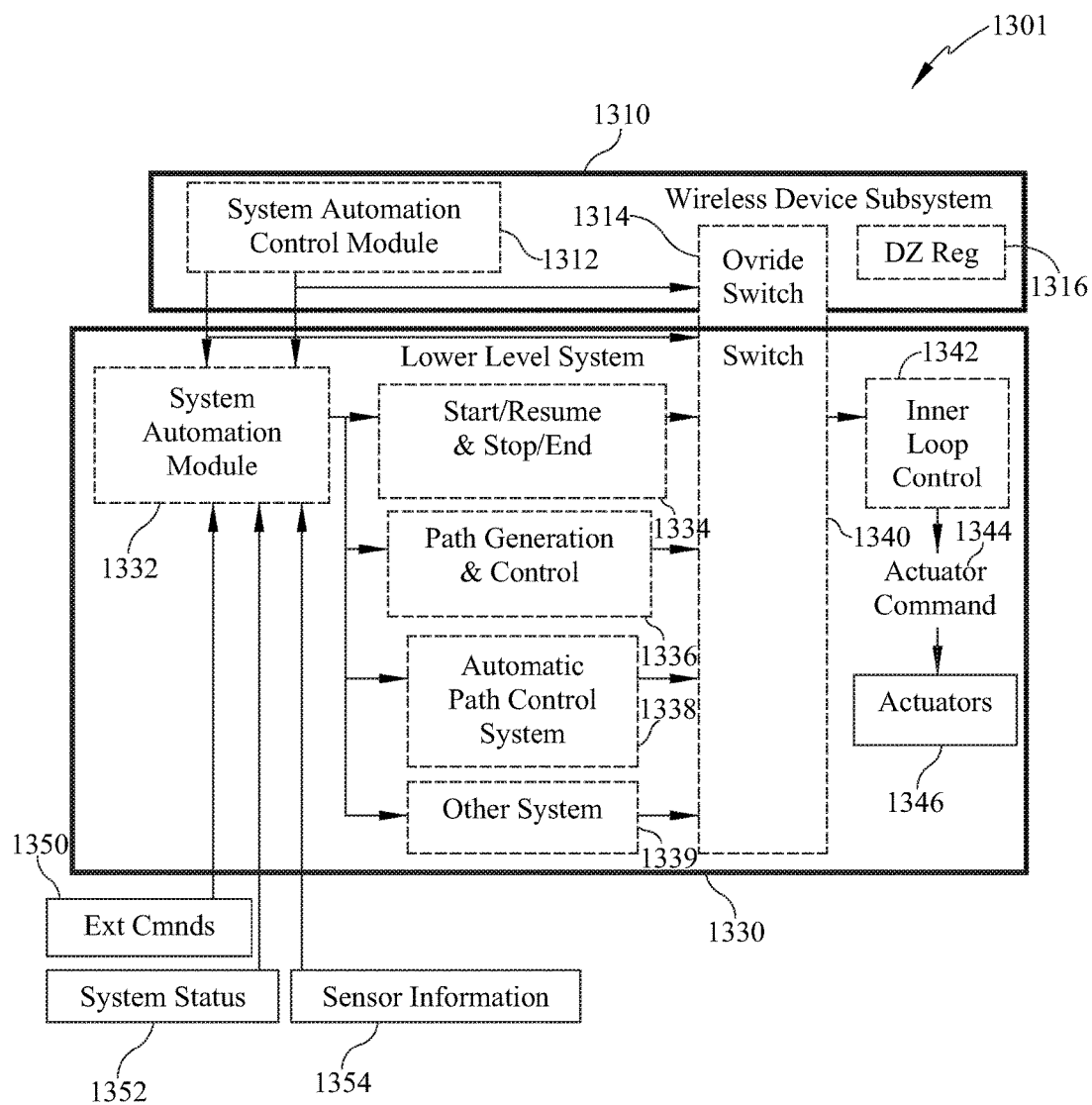


FIG. 13A



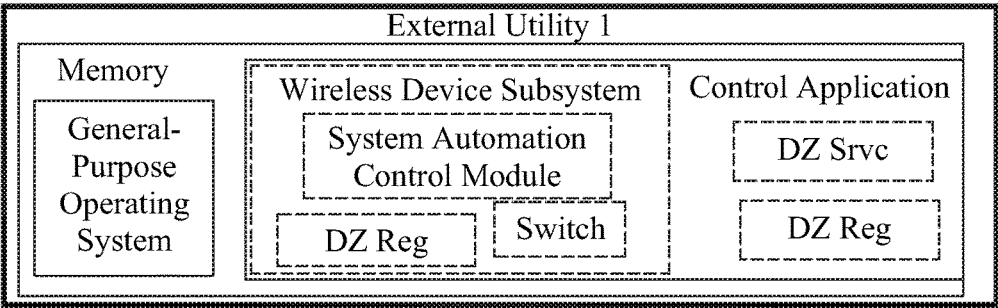


FIG. 13B

Device	Reg. Info	Reg. Date	Permitted Users	User Recognition	Location of Use	Deadzone1	DeadzoneN	Functionalities Disabled	Other

FIG. 13C

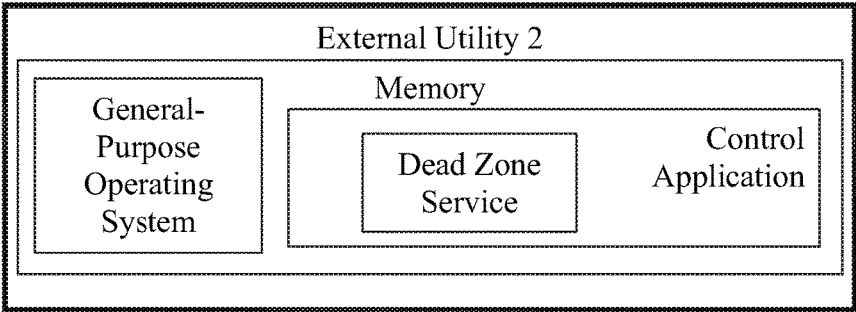


FIG. 13D

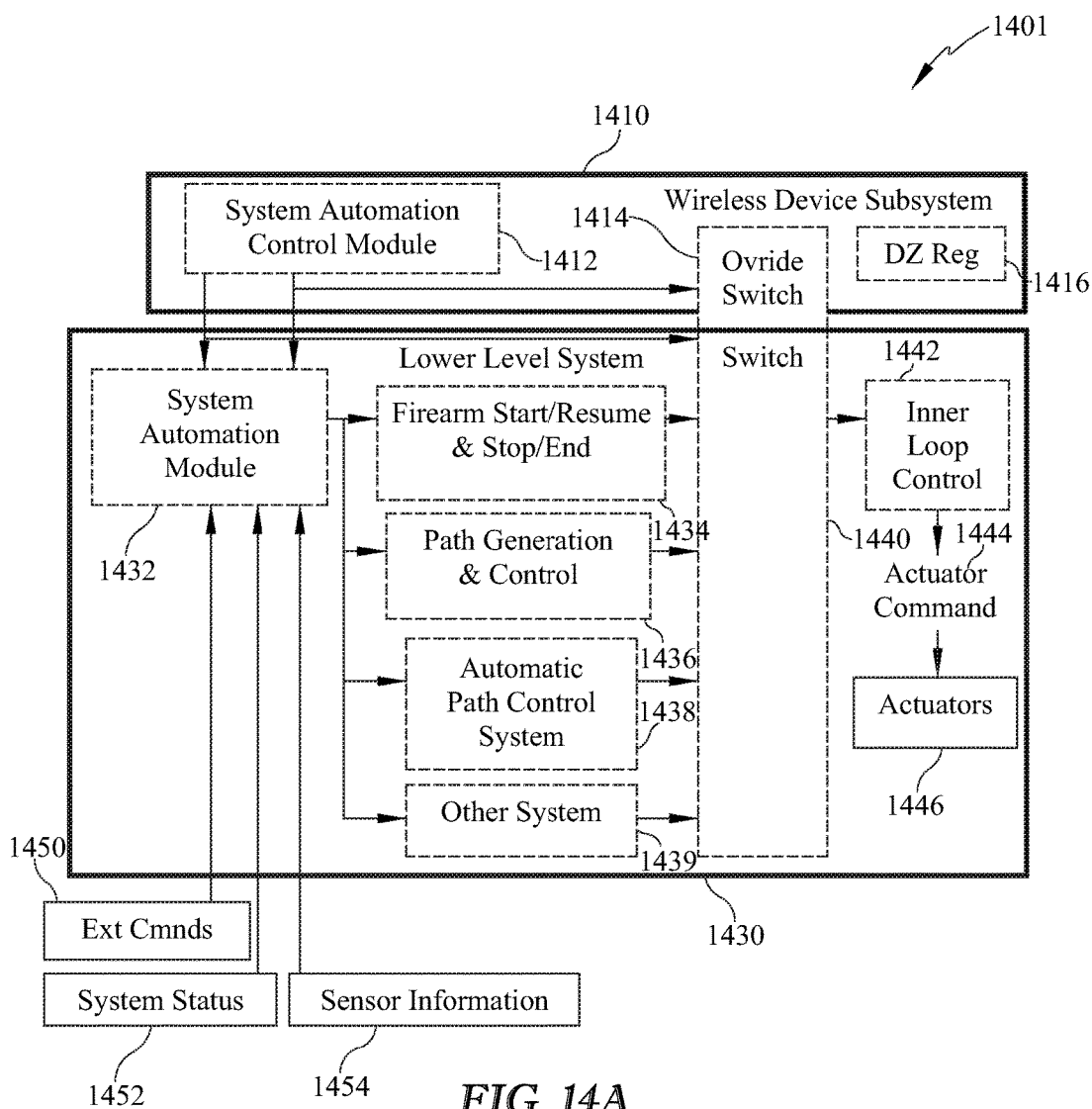


FIG. 14A

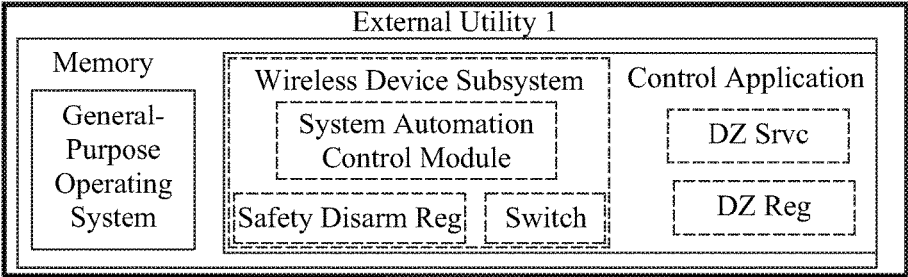


FIG. 14B

Firearm	Reg. Info	Reg. Date	Permitted Users	User Recognition	Location of Use	Deadzone1	DeadzoneN	Functionalities Disabled	Other

FIG. 14C

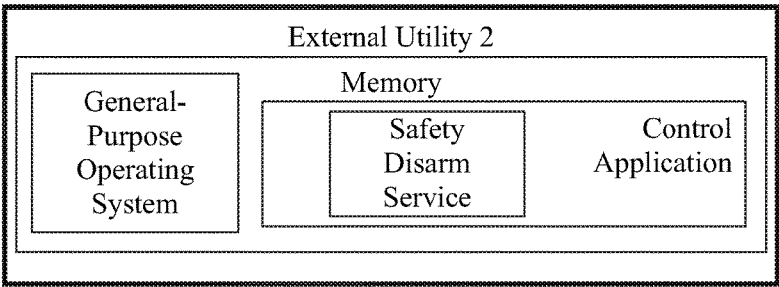


FIG. 14D

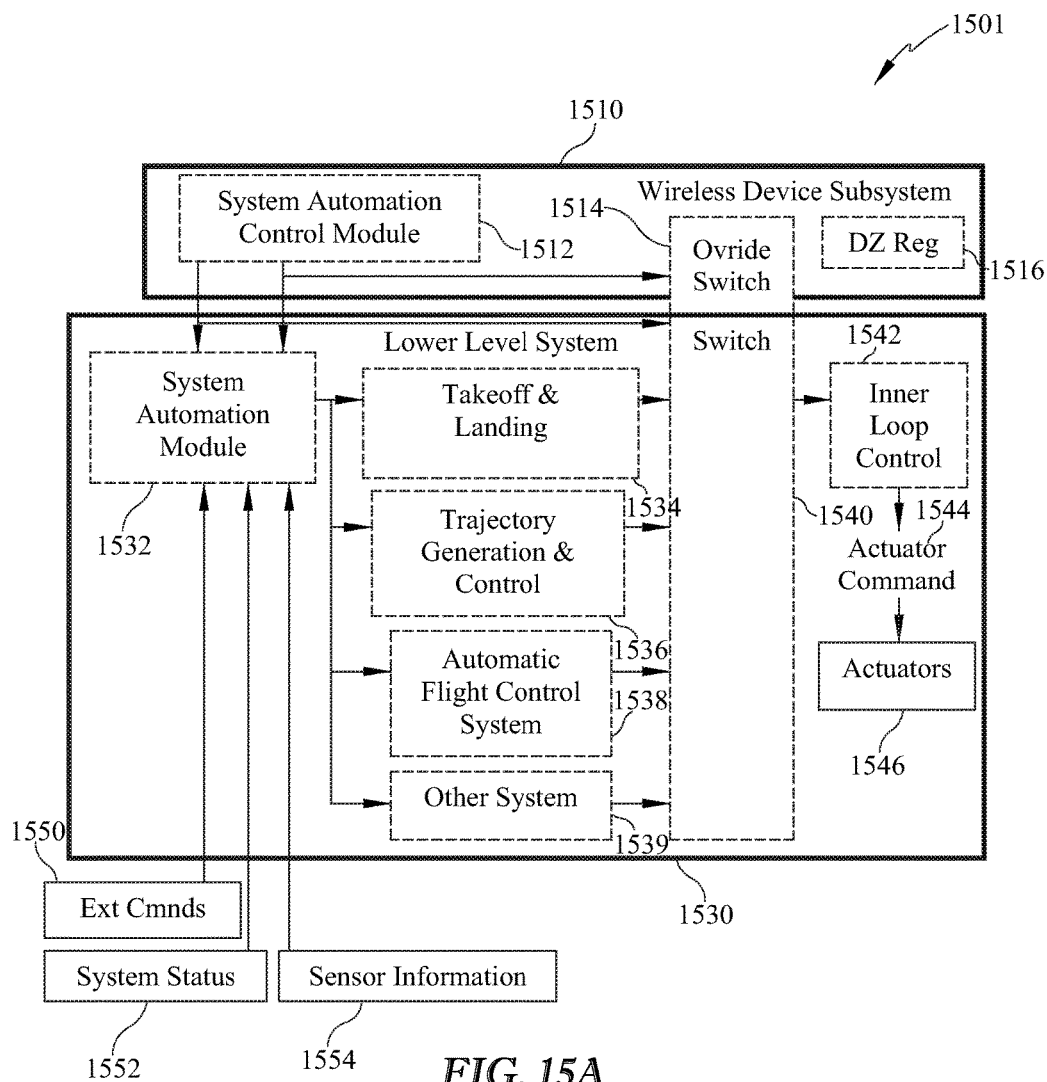


FIG. 15A

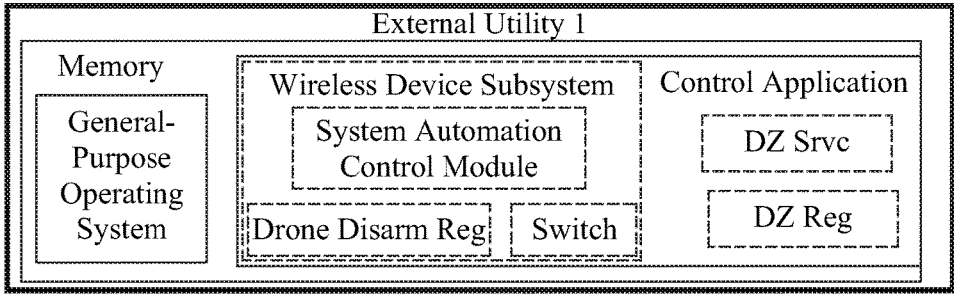


FIG. 15B

Drone Device	Reg. Info	Reg. Date	Permitted Users	User Recognition	Location of Use	Deadzone1	DeadzoneN	Functionalities Disabled	Other

FIG. 15C

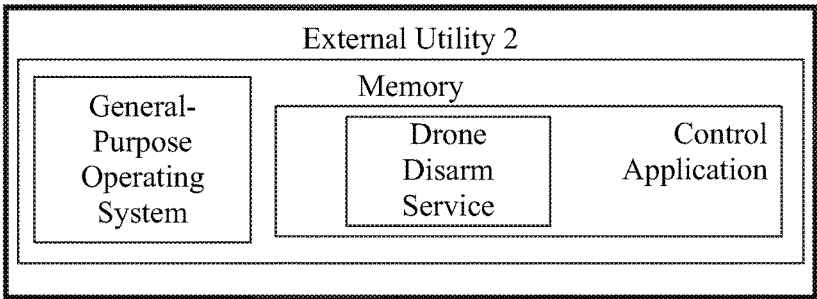
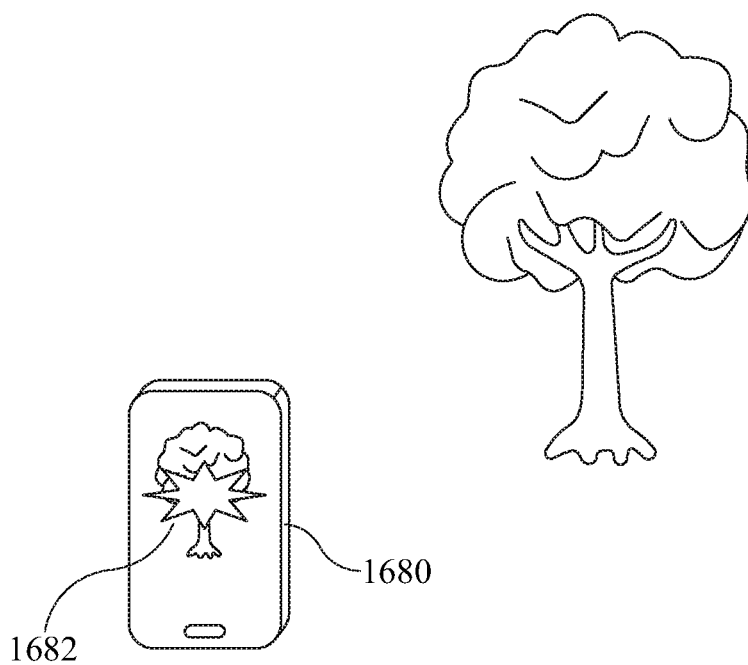


FIG. 15D



**FIG. 16A**

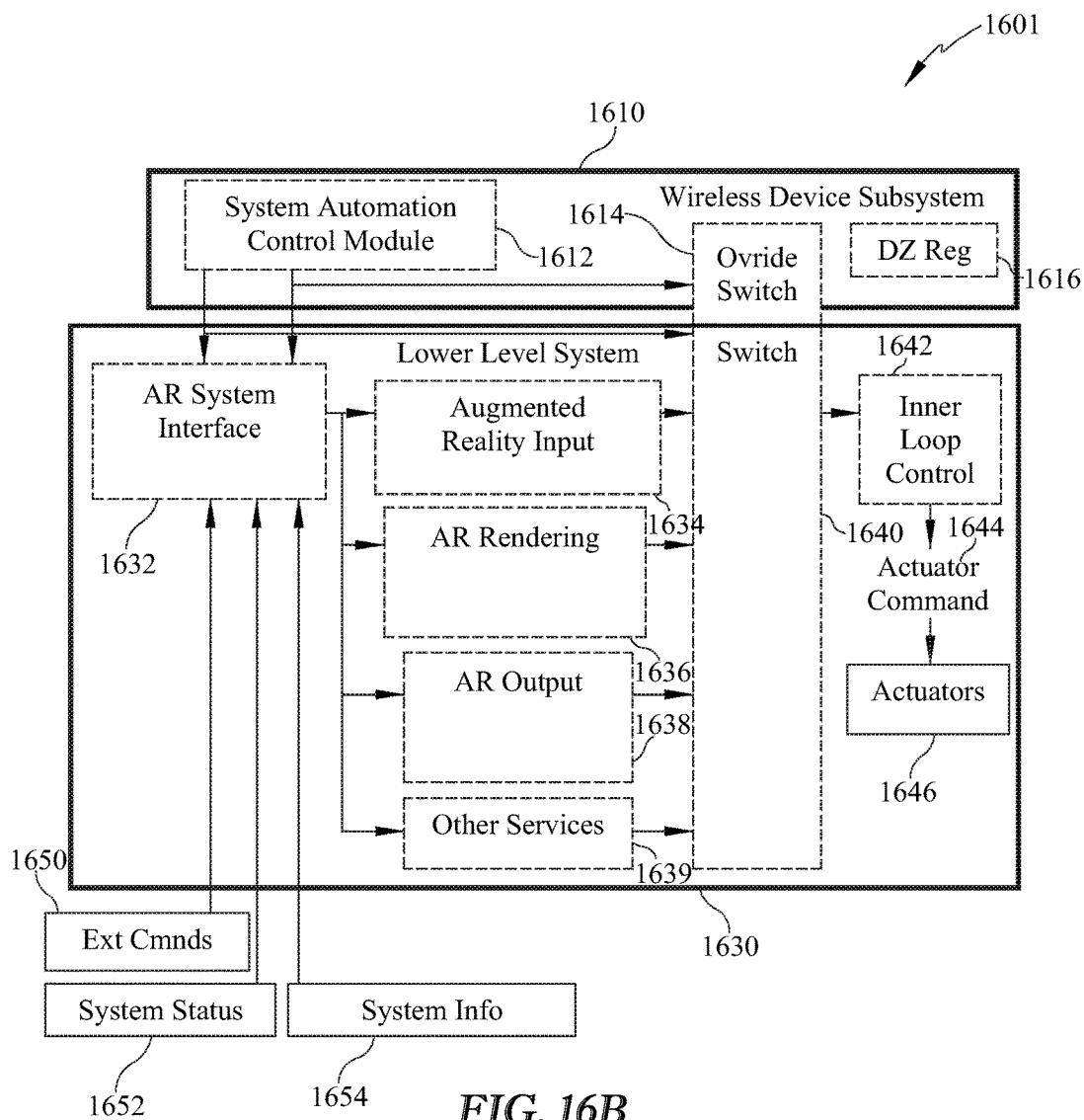


FIG. 16B

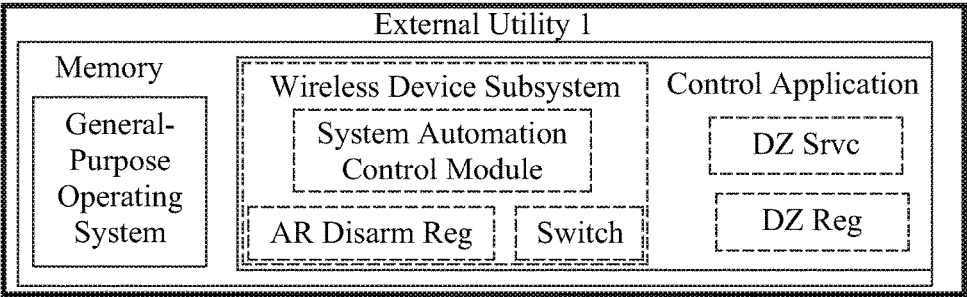


FIG. 16C

AR Application	App Reg.	Reg. Date	Permitted Users	Application Type	Location of Use	Deadzone1	DeadzoneN	Functionalities Disabled	Other

FIG. 16D

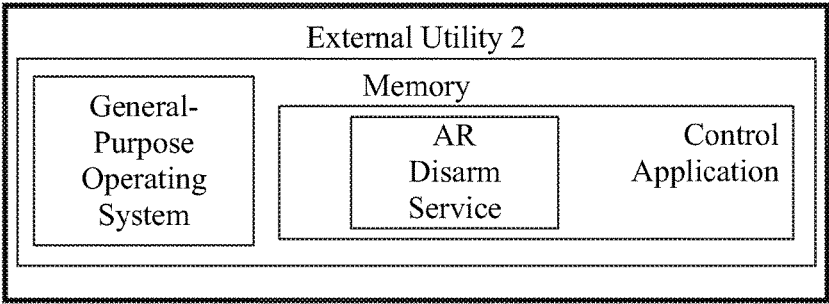


FIG. 16E



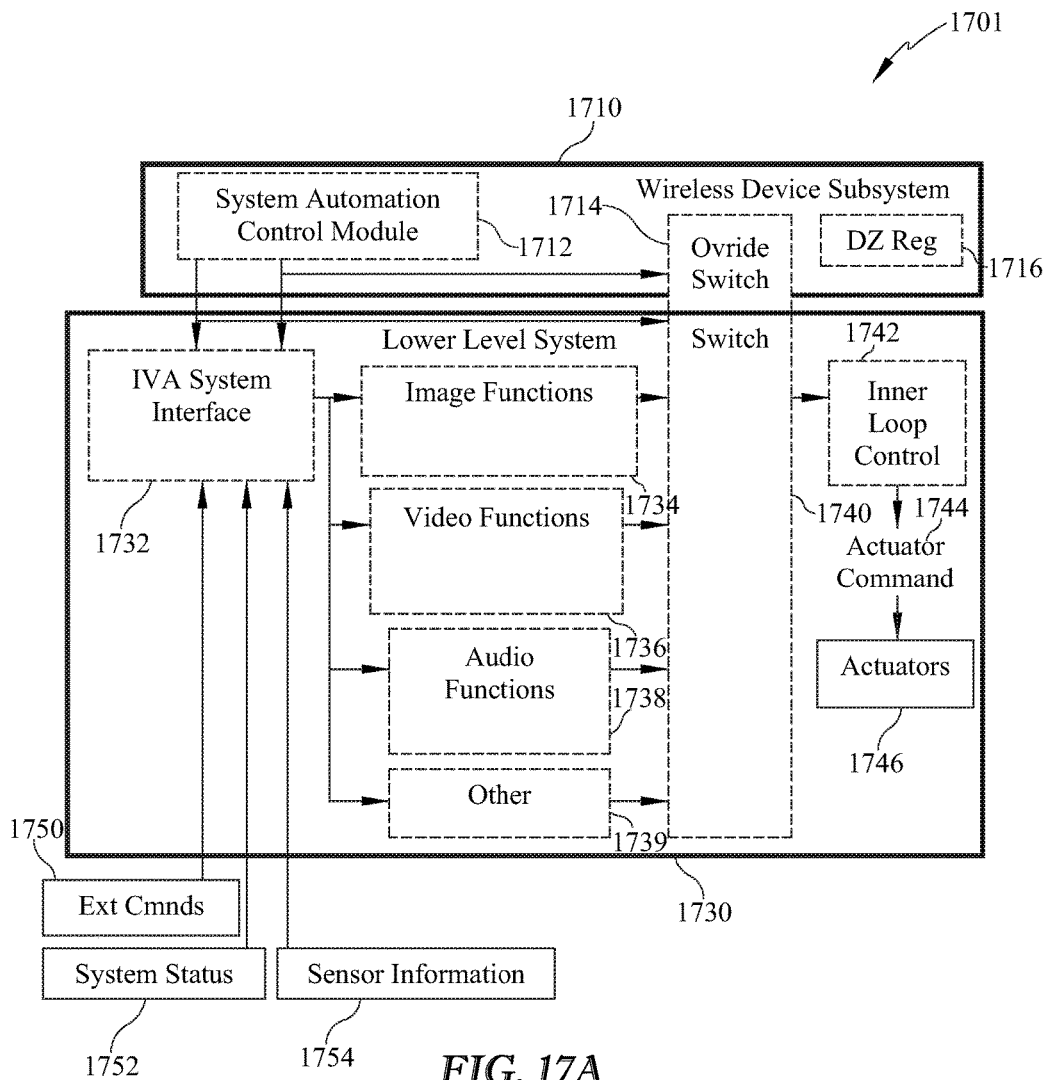


FIG. 17A

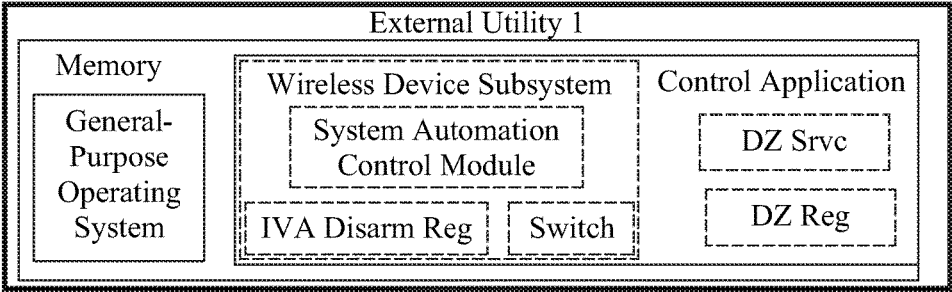


FIG. 17B

IVA Application	App Reg.	Reg. Date	Permitted Users	Application Type	Location of Use	DeadzoneI	DeadzoneN	Functionalities Disabled	Other

FIG. 17C

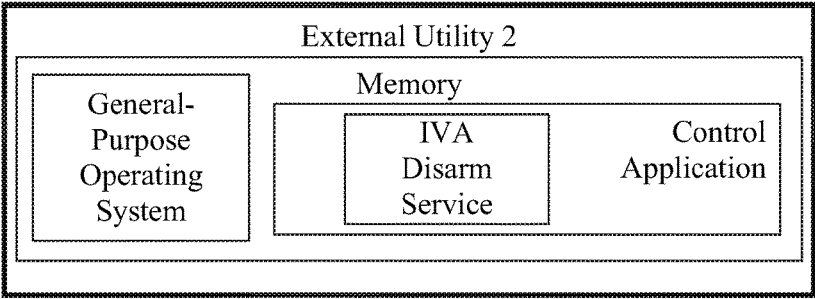


FIG. 17D

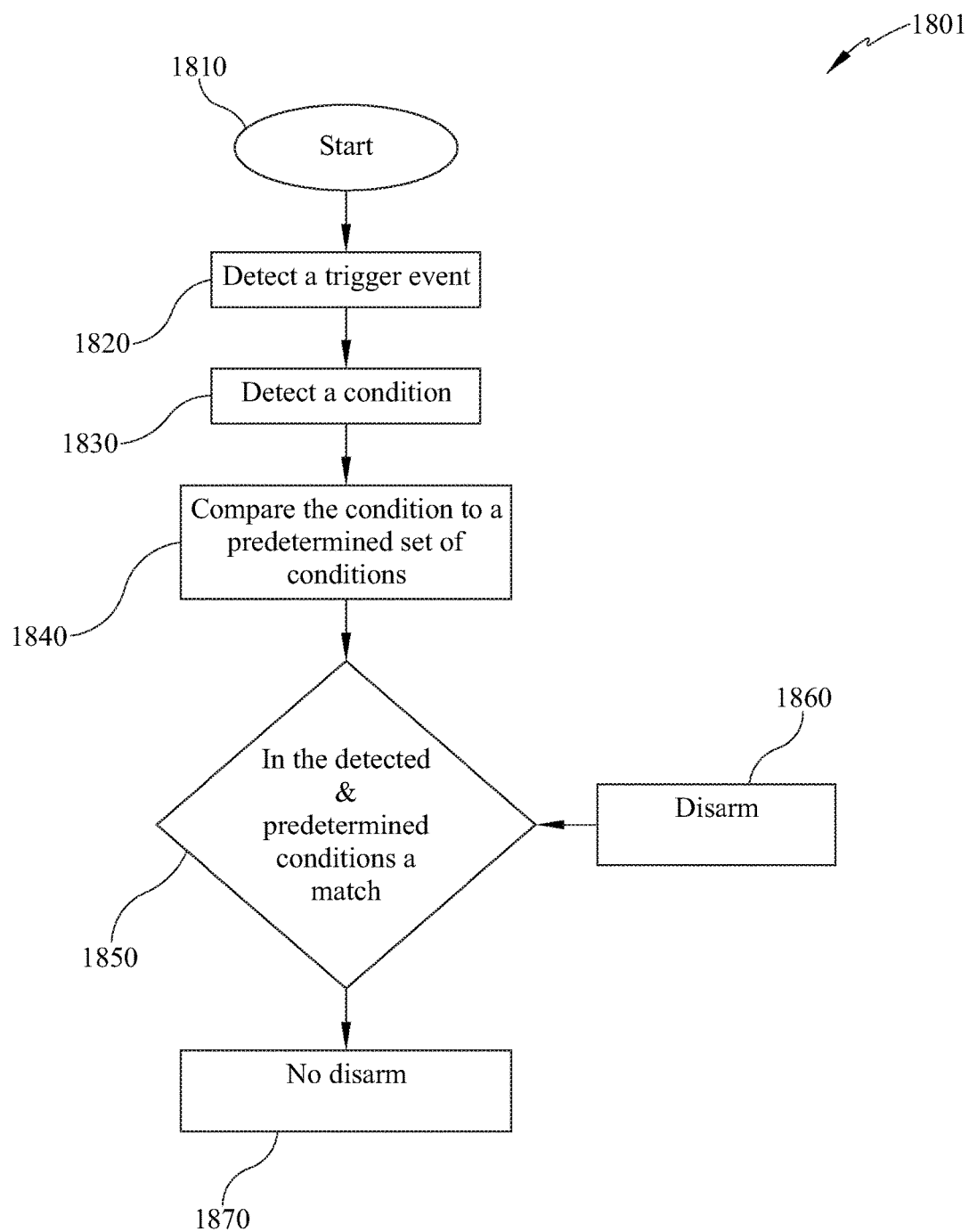


FIG. 18

**DEAD ZONE FOR WIRELESS DEVICE****CLAIM TO PRIORITY**

[0001] This application claims priority to and the benefit of each the following pending applications, the contents of which are hereby incorporated by reference in their entirety: the present application is a continuation-in-part of non-Provisional application Ser. No. 15/663,660 filed Jul. 28, 2017, titled "Safety Disarm for Firearm", Docket No. JL00900.016; which claims priority from Provisional Application Ser. No. 62/368,828 filed Jul. 29, 2016 titled "Safety Disarm for Firearm", Docket JL0900.008; Provisional Application Ser. No. 62/368,833 filed Jul. 29, 2016, titled "Dead Zone for Wireless Communication Device", Docket JL0900.009; Provisional Application Ser. No. 62/369,620 filed Aug. 1, 2016 titled "Safety Disarm for Firearm", Docket JL0900.010; and non-provisional application Ser. No. 15/663,660 is also a continuation-in-part of application Ser. No. 15/620,288, filed Jun. 12, 2017, titled "Dead Zone for Wireless Communication Device", Docket JL0900.011, and issued as U.S. Pat. No. 9,913,200; non-provisional application Ser. No. 15/620,288 is a continuation of Non-provisional application Ser. No. 13/462,712, filed May 2, 2012 JL0900.005 and issued as U.S. Pat. No. 9,681,358; non-provisional application Ser. No. 13/462,712 is a continuation of application Ser. No. 12/571,090 filed Sep. 30, 2009, Docket JL0900.002 abandoned, which claims priority from Provisional Application 61/195,016, filed Oct. 2, 2008. Additionally, this application claims priority to and the benefit of: U.S. Provisional Application Ser. No. 62/562,880, filed Sep. 25, 2017, and titled "Dead Zone for Wireless Communication", Docket JL0900.018, the entirety of which is incorporated herein by reference; and U.S. Non-Provisional application Ser. No. 15/910,190, filed Mar. 2, 2018, and titled "Dead Zone for Wireless Communication Device", Docket JL0900.019, the entirety of which is incorporated herein by reference.

**FIELD OF INVENTION**

[0002] Embodiments of the invention are directed to wireless communication devices and more particularly to a wireless communication device system, a wireless communication device, and a wireless communication method for disabling the use of wireless communication devices in places where they should not be used.

**BACKGROUND**

[0003] The cell phone is a widely used device. These devices allow people to talk, send text messages, emails, etc. The upside of these devices is that they allow people to stay connected anywhere anytime. The downside is that these devices are sometimes used in places or at times when they should not be used. For example, studies have shown that use of a cell phone while driving can increase the risk of an accident. Still a number of people use cell phones while driving a motor vehicle. Despite laws restricting the use of cell phones while operating a motor vehicle in a number of States in the U.S., rampant cell phone use during driving continues through unawareness or disregard of these laws, hence risking injury to the caller and others through an accident. As another example, studies have shown that radio waves transmitted by wireless devices may interfere with medical equipment. Still, a number of people use cell phones

while in a hospital. Despite warnings telling callers to silence their cell phones when in the hospital, hospital cell phone use continues through unawareness or disregard of these laws, hence risking interference with medical equipment and the lives of those who depend on them. As yet further examples, there are places where the use of cell phones in places or at times may interfere with the public enjoyment, health, welfare, or safety. For instance, despite requests or common courtesy, a number of people use their cell phones during a movie theater, a performing arts hall, a church, or other places of public gathering, hence causing a distraction that may interfere with the movie, performance, worship or public gathering.

[0004] U.S. Pat. No. 6,979,724 is directed to a method for switching a cell phone from audible to silent mode of operation during a concert performance, a play, a conference, a meeting or dinner. An RF transmitter is provided with an omni-directional or directional antenna. The RF transmitter is locally mounted in the area where a cell phone is to be switched to silent mode of operation. The RF transmitter is programmed to broadcast a message containing a code. When in range of the RF transmitter broadcast, a cell phone that has been programmed to recognize the broadcast is automatically programmed by the broadcast to switch itself to silent mode of operation. Japanese laid open patent application H10-42371 is directed to a receiver/transmitter that is locally mounted at a hospital in the area where a cell phone is not to be used. The receiver/transmitter broadcasts a signal and waits for acknowledgement by a cell phone. On acknowledgement, a microcomputer associated with the receiver/transmitter determines whether the phone is set up for use. If the phone is so set up for use, the microcomputer broadcasts a warning over a speaker mounted in the hospital that the phone is not to be used in the hospital. Japanese laid open patent application J11-004190 is directed to a cell phone accessory that monitors engine speed and parking brake activity. The accessory is connected to a cell phone in a car to detect incoming calls to the cell phone. On detection of an incoming call, the accessory suppresses or reduces the volume of the cell phone ring tone and diverts the call for recording on an answering machine residing in the accessory for playback. Neither prior art disables the use of wireless communication devices in places where they should not be used.

[0005] There is a need for a communication system, device, and method for disabling the use of wireless communication devices in places where they should not be used.

**SUMMARY**

[0006] Communication system, device, and method are provided that disables the use of wireless communication devices or of particular functions of wireless communication devices in places where they should not be used.

[0007] The inventive communication system comprises a wireless communication device having a GPS detector or other location detector for providing positioning data on the communication device; a network for controlling wireless communication over the network, the network receiving the positioning data from the communication device and comprising a no communication zone register including a database of predetermined zones in which certain communication by, to, or by and to the wireless communication device or certain functions of the wireless communication device are to be disabled (i.e., dead zone). In operation, the network

tracks the location of the wireless communication device based on the positioning data on the wireless communication device. When the wireless communication device is in a dead zone, the network disables the certain communication by, to, or by and to said wireless communication device and/or functions of the wireless communications device. The disabling of the certain communication or functions with respect to the wireless communication device may occur by network enablement of a service restriction on the network that prevents the wireless communication device to place, receive, or place and receive certain calls while the communication device is in the dead zone. Alternatively, the disabling of communication or functions with respect to the wireless communication device occurs by network enablement of a flag in the wireless communication device using over the air programming techniques. When service is interrupted, the network may send the communication device a message indicating that service is interrupted because the communication device is in a no communication zone. The register and position data may also be used to enable or modify functions of the wireless communication device, including communication functions.

**[0008]** The inventive wireless communication device is provided with a GPS detector or other location detector for providing positioning data and comprises a no communication zone register including a database of predetermined zones in which communication by, to, or by and to the wireless communication device is to be disabled and/or functions of the wireless communications device are to be disabled. The inventive wireless communication device tracks its location based on positioning data and when the wireless communication device is in one of the predetermined zones in which certain communication by, to, or by and to the wireless communication device is not permitted (i.e., dead zone) or in which functions of the wireless communication device are to be disabled, the wireless communication device is disabled from handling said certain communication by, to, or by and to the wireless communication device and/or certain functions of the wireless communications device. The disabling of communication or other functions with respect to the wireless communication device may occur by enablement of a flag in the wireless communication device that prevents the wireless communication device to place, receive, or place and receive the certain communication while the communication device is in the dead zone. When service is interrupted, the wireless communication device may display a message indicating that service is interrupted because the communication device is in a no communication zone. The register and position data may also be used to enable or modify functions of the wireless communication device, including communication functions.

**[0009]** The inventive method of disabling predetermined communication by, to, or by and to a wireless communication device comprises: creating a no communication zone of locations where said wireless communication device is to be disabled or functions of the wireless communication device are to be disabled, enabled, or modified; tracking predetermined positioning data on the wireless communication device; querying whether the predetermined positioning data is within a no communication zone location; if the wireless communication device is in a no communication zone location, disabling certain communication by, to, or by

and to the wireless communication device and/or disabling, enabling, or modifying functions of the wireless communication device.

**[0010]** The predetermined zone may be a GPS location (or other location data) or the speed of movement of the wireless communication device in the network, which may optionally be derived from GPS position data. In one embodiment, the wireless communication device and/or the network recognize the wireless communication device is operating in a hands free mode of operation and may allow the communication device to send and receive messages when the device is operating in hands free mode of operation. The certain communication disabled may exclude communication of an emergency call.

#### DESCRIPTION OF DRAWINGS

**[0011]** FIG. 1 shows a representative prior art cell phone system.

**[0012]** FIG. 2 shows a representative prior art cell phone system of FIG. 1 provided with GPRS service designed for GSM networks.

**[0013]** FIG. 3 shows a representative prior art cell phone system of FIG. 2 provided with global positioning system (GPS).

**[0014]** FIG. 4 shows a system embodiment of the invention.

**[0015]** FIG. 5 shows an embodiment of a no zone register.

**[0016]** FIG. 6 shows a logic flow for the system embodiment of FIG. 4 implemented with the no zone register of FIG. 5.

**[0017]** FIG. 7 shows another embodiment of an inventive no zone register.

**[0018]** FIG. 8 shows a logic flow for the system embodiment of FIG. 4 implemented with the no zone register of FIG. 7.

**[0019]** FIG. 9 shows a logic flow for the system of FIG. 4 implemented with the no zone register of FIG. 7 in a network that recognizes whether a mobile terminal in the network is being used in a hands free mode of operation.

**[0020]** FIG. 10 shows an alternative wireless communication device embodiment of the invention.

**[0021]** FIGS. 11A, 11B-1 and 11B-2, and 11C show an illustrative embodiment of this disclosure. (FIGS. 11B-1 and 11B-2 collectively FIG. 11B.)

**[0022]** FIG. 12 shows an illustrative embodiment of FIG. 11 of this disclosure.

**[0023]** FIGS. 13A, 13B, 13C, 13D depict an illustrative embodiment of this disclosure.

**[0024]** FIGS. 14A, 14B, 14C, 14D depict an illustrative embodiment of this disclosure.

**[0025]** FIGS. 15A, 15B, 15C, 15D depict an illustrative embodiment of this disclosure.

**[0026]** FIGS. 16A, 16B, 16C, 16D depict an illustrative embodiment of this disclosure.

**[0027]** FIGS. 17A, 17B, 17C, 17D depict an illustrative embodiment of this disclosure.

**[0028]** FIG. 18 shows a method of this disclosure.

#### DETAILED DESCRIPTION

**[0029]** Prior art FIG. 1 shows a representative prior art cell phone system 5 comprising a network 10, a plurality of mobile terminals 70, such as cell phones, and in between the network and cell phone, an air interface 60. Network 10

typically includes a mobile switching center (MSC) 20, an operational support center (SC) 50, visiting location registers (VLR) 51, 52, and base station controllers 54, 55, 56, and base transceiver station (BTS) 58 which may be collectively referred to as base station subsystem (BSS) 53. In the illustrative system of FIG. 1, mobile terminal (MT) 70 is illustratively based on the Groupe Speciale Mobile (GSM) standard, but may be based on other standards. MT 70 comprises a mobile unit 72 having an antenna 74, a receiver/demodulator 76, a microcontroller 78, memory 80, international mobile equipment number 82, and a user identity module 84 also referred to as a subscriber identify module or SIM. MT 70 communicates with network 10 through air interface 60.

[0030] Mobile switching center 20 is a telecommunications switch deployed in network 10 to provide call control, processing and access to the public switched telephone (fixed) network. The home location register (HLR) 22 is a database that is maintained by a user's home carrier or the mobile operator with whom the user has initiated service. HLR 22 stores information about the user, including the user profile (preferences), account status, features and capabilities. VLR 51, 52 is a database used by the serving carrier to manage service requests from mobile users who are away from the home system.

[0031] When MT 70 is powered on the IMSI or MIN of the mobile is sent to network 10 via the air interface 60. The mobile request to use the network is picked up by BTS 58. The call is directed to the MSC 20 that oversees the switching in which the mobile was powered on in. MSC 20 determines whether MT 70 is in its "home" area or whether it is a "visitor". MSC 20 makes this determination based on the IMSI or MIN information. If in the home area, HLR 22 provides information for handling both origination of a call and placement of a call. It does so based on service subscription information, service restrictions and supplementary information in HLR 22. If in a visitor area, VLR 51, 52 requests information from the HLR 22 where MT 70 is registered so that the visited system can process the call appropriately. If MSC 20 determines that the mobile is authorized to use network 10, MSC 20 logs the phone onto network 10 and tells the mobile it is logged on.

[0032] Once logged on, when a user dials a GSM mobile subscriber's MSISDN or a TIA network MIN, the call is sent to MSN 20 which interrogates HLR 22 of the caller to obtain authorization and routing information stored in the service profile of the user associated with his MSISDN or MIN. MSC 20 illustratively routes the call over a public switching telecommunications network (PSTN) to the HLR of the number called. Based on the IMSI or MIN number, the called HLR looks up the called subscriber profile as well as the current VLR 51, 52 at which the called subscriber is registered. The called HLR 22 generates a response message and sends it back to the calling MSC 20. MSC 20 then attempts to complete the call based on the location of the destination provided by called HLR 22.

[0033] Billing tickets for calls made in network 10 are typically produced on MSC 20. MSC 20 provides the billing tickets to the SC 50 which provides the interface to the customer invoices and the bills. SC 50 includes systems for billing the subscribers as well as for subscriber administration, fraud detection, and voice mail. These systems collect billing data generated by MSC in network 10 and manage the subscriber databases in network 10.

[0034] Prior art FIG. 2 shows the representative prior art cell phone system 5 of FIG. 1 provided with GPRS service designed for GSM networks. GPRS provides an overlay service onto GSM that allows the mobile to access the Internet. GPRS allows a mobile to provide high-speed Internet data communications using the existing GSM air interface. GPRS provides a direct interface to the Internet services for GSM mobile devices and is implemented in an existing GSM network with the addition of two new elements. These elements are a Signaling GPRS Service Node (SGSN) 27 and a Gateway GPRS Service Node (GGSN) 26. Additional modifications to the base station systems to include packet control units may also be required. GPRS allows a mobile to typically have an endless connection to an IP network that may stay open at low cost so that the mobile is connected to the network and enabled to connect to the Internet on initiation of a GDP Context message. Voice calls on GPRS handsets are routed by MSC 20 using the same circuit switched channels and protocols of GSM.

[0035] Prior art FIG. 3 shows the representative prior art cell phone system 5 of FIG. 2 provided with global positioning system (GPS). The U.S. Global Positioning System is a constellation of 24 satellites which orbit the earth in 12 hour orbits. The satellites are arranged in six orbital planes each containing four satellites. The constellation provides a user with approximately five to eight satellites visible from any point on earth. These satellites transmit as part of their message both satellite positioning data called "ephemeris" data and clock timing data. The satellites also transmit time-of-week information which allows a receiver to determine accurate time. Many new phones in the U.S., for example, have some GPS receiving capability built in. As shown in FIG. 3, MT 70 further comprises a GPS antenna 86 and GPS acquisition circuitry 88 for capturing satellite messages for use in calculating MT 70 receiver location and other information such as speed and direction. Assisted GPS enhances the performance of the GPS system by helping MT 70 locate satellite signals when MT 70 is surrounded by tall buildings or is indoors or under trees and assist MT 70 in calculating its position. GPRS functionality in MT 70, which allows direct connection to the Internet services for GSM mobile devices using SGSN 27 and GGSN 26, allows MT 70 GPS location information to be provided to network 12 regularly to allow network 12 to provide real time location data on MT 70. GPS location information on MT 70 may be stored in GPS-R register 30. Network 10 may use real time GPS data to track MT 70 through the network or use information derived from GPS data such as speed and direction of travel of MT 70. This information may be stored in GPS-R register 30. In some cases, a service provider may provide MT 70 with GPS functionality that is accessibly by third-party applications. Some companies like Accu-Tracking have developed software for installation on an MT 70 having such third party accessible GPS functionality. For a subscriber, Accu-Tracking tracks GPS data on MT 70 including direction of travel and speed of travel and displays these parameters on a subscriber Website for viewing by the subscriber over a computer. This service allows for example a parent to use an MT 70 of a child to track the movement of the child and if the child is driving a car to track the speed of the car. The service even permits audible alerts to be sent to MT 70 in the event the child is speeding.

[0036] All of the foregoing is common knowledge to one skilled in the art.

[0037] FIG. 4 shows an embodiment of the present invention. A cell phone system 105 comprises the representative prior art cell phone system 5 of FIG. 3 and a no communication zone register (NZR) 32. The representative elements of the prior art phone system 5 shown in FIG. 3 have been previously described. FIG. 5 shows an embodiment of NZR 32. As shown in FIG. 5, NZR 32 is a register that may include a table of geographical locations 210. Geographical locations 210 are physical locations in network 110 in which communication by or to MT 70 over network 110 is to be disabled and/or functions of the MT 70 are to be disabled, enabled or modified. Geographical locations 210 may be a hospital, a movie theater, a performing arts hall, a church, or other places where the use of cell phones may interfere with the public enjoyment, health, welfare, or safety. GPS positions 220 of the geographical locations 210 are provided for identifying the GPS positions of the locations. For a location that may be identified by an area of GPS positions, these GPS positions would be provided as GPS position 220 in the database of NZR 32.

[0038] In operation, GPRS functionality in MT 70 allows MT 70 GPS location information to be provided to network 110 regularly to allow network 110 to have real time location data on MT 70. GPS location information on MT 70 and derivative information such as speed and direction of travel of MT 70 generated by network 110 may be stored in GPS-R register 30. MSC 20 regularly queries whether the GPS location information of MT 70 is within a no communication zone (i.e., dead zone). If NZR 32 indicates MT 70 is not in a dead zone, the communication functionality of MT 70 remains enabled. If NZR 32 indicates MT 70 is in a dead zone, network 110 disables the communication functionality of MT 70 for so long as MT 70 is in the dead zone.

[0039] FIG. 6 shows a logic flow diagram for an embodiment. As shown, network 110 periodically or continuously employs an embodiment by entering the logic shown in FIG. 6 at the start control block 610. At control block 620, network 110 obtains the present GPS location of MT 70 from GPS-R register 30. At control block 640, network 110 queries whether the present GPS location of MT 70 is within a no communication zone location. This may be done by MSC 20 comparing the present location of MT 70 to the GPS locations contained in NZR 32. A match indicates MT 70 is in a no communication zone whereas a no match indicates that MT 70 lies outside that communication zone. If the query done at control block 640 indicates MT 70 is not in a no communication zone (i.e., dead zone), control branches to control block 670 where MSC 20 queries whether MT 70 is disabled. If MT 70 is not disabled because it was not in a dead zone, MSC 20 flows to control finish block 690 and the process is finished. If MT 70 is disabled because on the last pass through the control logic MT 70 was in a dead zone but on the current pass MT 70 is no longer in a dead zone, MSC 20 enables communication functionality of MT 70 at control block 680 and the process flows to control finish block 690. If the query at control block 640 indicates MT 70 is in a dead zone, control flows to control block 650 where network 110 queries whether the communication functionality of MT 70 is disabled. If the communication functionality is disabled, control flows to control finish block 690. If the control functionality is not disabled, network 110 control flows to control block 660 where the

communication functionality of MT 70 is disabled after which the process flows to control finish block 690. Network 110 will keep communication functionality of MT 70 disabled for so long as MT 70 remains in the dead zone.

[0040] In the embodiment of FIG. 6, the control block 650 function of flagging off service for MT 70 may be done based on programmed service subscription information, service restrictions and supplementary information provided in HLR 22. For example, service restrictions on MT 70 may include disabling the service of MT 70 when MT 70 is in a dead zone. The same goes for service enablement. Alternatively, MT 70 service may be disabled or enabled using well known over-the-air programming techniques.

[0041] FIG. 7 shows another embodiment in which NZR 32 contains a database of states and information on whether the state allows cell phones to be used in a moving vehicle. In this embodiment, the moving vehicle may be a car or truck or motorcycle or bicycle and the allowable speed may be as simple as allowable or not. For example, states that do not allow the use of cell phones while driving would be denoted on the list as not allowable whereas the other states would be denoted as allowable. Referring to the logic flow of this embodiment shown in FIG. 8, after entering the control process at control start block 710 MSC 20 would obtain the GPS speed of MT 70 at control block 720 and at control block 740 query whether the speed of movement of MT 70 is at or above the speed denoted in NZR 32 shown in FIG. 7. If the speed of movement of MT 70 is at or above the speed denoted in NZR 32, then process flows to control block 750 and continues on in a manner similar to the manner described with like process control blocks shown in FIG. 6. If the speed of movement of MT 70 is not at or above the speed denoted in NZR 32, then process flows to control block 770 and continues on in a manner similar to the manner described with like process control blocks shown in FIG. 6.

[0042] In the example, the speed denoted in NZR 32 is either allowable which means that MT 70 may be used in vehicles or not allowable which means that MT 70 may not be used while driving. Alternatively, in states where use of a cell phone while driving is not permitted, NZR 32 may be set at a low speed instead of a no speed condition as specified in the prior example in order to allow for the possible use of a cell phone in a moving but non-driving condition, such as, while walking. By trading off a no speed condition in NZR 32 for a speed of, for example, a typical walking speed of a person, such as 5 miles per hour, the cell phone would be useable while walking but not when driving at speeds at or above 5 miles per hour.

[0043] In a further embodiment, in some states, cell phone use while driving is permitted so long as done using a hands free device. FIG. 9 shows an illustrative embodiment of a logic flow diagram which recognizes whether MT 70 is being operated in hands free mode of operation. When operated in hands free mode of operation, MT 70 detects the hands free operation and transmits that information to network 110. In this example, NZR 32 in FIG. 7 would further include a designation of allowable with hands free condition in addition to the allowable and not allowable conditions previously described. In the process flow shown in FIG. 9, the network obtains the GPS speed of MT 70 at control block 820 and further obtains the hands free use information of MT 70 at control block 830. At control block 840, a no communication zone condition would occur if, for the state

which requires MT 70 to be operated in a hands free mode of operation for MT 70 to be useable while driving, the MT 70 information obtained by network 110 shows MT 70 to have a GPS speed that satisfies the speed condition for disablement of communication and the condition of being used without a hands free. Based on this query at control block 840 network 110 proceeds through the remaining process shown in FIG. 9 in a manner similar to the manner described with like process control blocks shown in FIG. 6.

**[0044]** The foregoing embodiments preferably would not disable the ability of cell phones to place 911 or like calls for emergency purposes. In addition, there may be other instances in which calls may likewise be permitted such as in connection with calls from or to family members.

**[0045]** In another embodiment, the network in either one or more of the foregoing embodiments may be provided with a messaging service for messaging MT 70 that service is interrupted because the communication device is in a no communication zone. For example, messaging may be generated by the network and transmitted to MT 70 via gateway SMSG 24 and illustratively displayed in text form on a display on MT 70. Messaging an MT 70 via SMS gateway SMSG 24 is common knowledge to one skilled in the art.

**[0046]** While the foregoing embodiments illustrate the use of GPS location and derived speed, alternative embodiments may be useable with any GPS direct or derived information. As one example, where acceleration is derived from GPS data, the use of MT 70 could be conditioned on the acceleration of MT 70 in the network. In addition, embodiments may create conditions of dead zone of operation based on a blend of GPS and non-GPS data available to the network. For example, a dead zone may be further conditioned on the time of day of use of MT 70 such that at certain times of day a dead zone would exist to disable use of MT 70 whereas at other times of day the dead zone would be lifted to allow MT 70 to be used in that zone. In previous example further illustrates that embodiments may be used alone or in combination with one or more direct or derived information. As yet another example of the use of embodiments with a combination of information, in the situation where the operation of a communication device is not allowed in a city but allowed outside of a city, embodiments of the invention may track both the location of MT 70 with respect to the city as well as the speed of the MT 70 at its location. Whether MT 70 would be operable would turn on the conditions that MT 70 satisfies where used.

**[0047]** In the previous embodiments, except as to establishments that may be mandated by applicable laws to be included on the dead zone list which would need to be included on the list, the network generates the dead zone list of hospitals, movie theaters, performing arts halls, churches, or other places where the use of cell phones may interfere with the public enjoyment, health, welfare, or safety, possibly based upon publicly available information. In another embodiment, if the establishment is listed on the dead zone list by default, unless it is one of the mandated establishments, the establishment may have the option to elect to be dropped from the list so as to allow MT 70 to be used in its establishment. For example, a restaurant that may be included on the dead zone list by default may elect to be dropped from the list in order to allow its customers to use MT 70 in its establishment. As yet another embodiment, any establishment that may not be included on the default dead zone list may have the option to elect to be included on the

dead zone. For example, a store or a football stadium may request to be included on the dead zone list in order to prevent the use of MT 70 from disturbing its patrons. As yet another example, inclusion of an establishment on the dead zone list may be by way of a service offering provided by the service provider. The service may be offered at no charge to an establishment or may offered on a subscription fee basis. With this service, an establishment may elect to have their establishment included on the dead zone list by subscription to the service.

**[0048]** FIG. 10 shows another embodiment of the invention in which in the representative prior art cell phone system 7 of FIG. 3 MT 70 includes a no communication zone register (NZR) 932 including a database of predetermined zones in which communication by, to, or by and to MT 970 is to be disabled and/or functions of MT 970 are to be disabled, enabled, or modified. In this embodiment, MT 970 tracks its location based on GPS positioning data (alone or with the aid of AGPS). When MT 970 is in one of the predetermined zones in which certain communication by, to, or by and to MT 970 is not permitted, MT 970 is disabled from handling the certain communication by, to, or by and to MT 970. NZR 932 is a register like shown and discussed in connection with FIG. 5 that may include a table of geographical locations. The listing of geographical locations may be limited by the size of the register. For example, in view of the size constraints of the available semiconductor space in MT 970, the geographical locations could be limited to a limited set of predetermined locations such as movie theaters within a 10 mile radius of the billing address of the mobile user. To be maintained current, NZR 923 could be updated by the network 12 in which MT 970 is authorized to be used by the employment of well-known over the air reprogramming technologies. The logic for the embodiment of the invention shown in FIG. 10 may be similar to the logic shown in FIG. 6 except that control block 620, which is shown to obtains GPS location of MT 70, would be done by MT 970 and not by the network as discussed in connection with FIG. 6.

**[0049]** As an alternative embodiment, NZR 932 may be a register like shown and discussed in connection with FIG. 7 that may include a table of conditions on the speed of MT 70. In this embodiment, MT 970 further comprises software for calculating the speed of MT 970 from GPS positioning data. Since speed is the distance traveled in a specified time, software may, using GPS position data, track the distance traveled by MT 970 in a specified time and calculate the speed. The sophistication of the calculation may be limited by available semiconductor considerations. The logic for this embodiment of the invention may be similar to the logic shown in FIG. 8 or 9 except that control block 720 and 820, which is shown to obtain speed information on MT 70, would be done by MT 970 and not by the network as discussed in connection with FIGS. 8 and 9.

**[0050]** In the embodiment of FIG. 10, the predetermined zone may be a geographical location, and may comprise a GPS position. Alternatively, the predetermined zone may comprise a condition on the speed of the wireless communication device in said network where the speed may be derived from GPS position data. Disabling of communication with respect to the wireless communication device in FIG. 10 may occur by enablement of a flag in the wireless communication device that prevents the wireless communication device to place, receive, or place and receive the



certain communication while the communication device is in the no communication zone. The condition on the speed of the wireless device may be taken from the group of no communication allowed, communication allowed, and communication allowed under certain preconditions. The device may recognize that the wireless communication device is operating in a hands free mode of operation. The certain communication disabled may exclude communication under conditions taken from the group of the speed of said wireless communication device is less than a predetermined speed and said wireless is being used in a hands free mode of operation. The certain communication disabled may exclude communication under an emergency call. On interruption of service, the device may display a message indicating that service is interrupted because the communication device is in a no communication zone.

**[0051]** As yet another embodiment, MT 970 may be used in the network shown in FIG. 4. One of the benefits of such a hybrid configuration in which both the network and the terminal contain a no communication zone register is that it may allow for quicker adoption of the technology. This by allowing, for example, legacy mobile terminals, that are without the architecture and/or semiconductor real estate that might allow for over the air reprogramming of the terminal with no zone register communication functionality, to be disabled using no zone communication registers located in the network while newer model terminals are provided with no communication functionality in the terminal.

**[0052]** In an embodiment of a method for disabling predetermined communication by, to, or by and to a wireless communication device, the method comprises: creating a no communication zone of locations wherein the wireless communication device is to be disabled; tracking predetermined positioning data on the wireless communication device; querying whether the predetermined positioning data is within the no communication zone location; and if the wireless communication device is in a no communication zone location, disabling certain communication by, to, or by and to the wireless communication device.

**[0053]** While the foregoing embodiments illustrate the use of GPS location and derived speed, in alternative embodiments the invention may be useable with any GPS direct or derived information. As one example, where acceleration is derived from GPS data, the use of MT 70 could be conditioned on the acceleration of MT 70 in the network. In addition, embodiments of the invention may create conditions of dead zone of operation based on a blend of GPS and non-GPS data. For example, a dead zone may be further conditioned on the time of day of use of MT 70 such that at certain times of day a dead zone would exist to disable use of MT 70 whereas at other times of day the dead zone would be lifted to allow MT 70 to be used in that zone. The previous example further illustrates that embodiments of the invention may be used alone or in combination with one or more direct or derived information. As yet another example of the use of embodiments of the invention with a combination of information, in the situation where the operation of a communication device is not allowed in a city but allowed outside of a city, embodiments may track both the location of MT 70 with respect to the city as well as the speed of the MT 70 at its location. Whether MT 70 would be operable would turn on the conditions that MT 70 satisfies where used.

**[0054]** While the foregoing embodiments for disablement of MT 70 have been disclosed, there are other ways well known to those skilled in the art in which communication by, to, or by and to a wireless communication device may be restricted and these other well-known ways provide yet other embodiments how the communication of MT 70 may be disabled and the implementation of these other ways of restricting the wireless communication of MT 70 are incorporated herein as to these other embodiments that use Applicant's dead zone invention for wireless communication devices. For example, disablement may occur by the network or device flagging on a feature that overrides the password of MT 70 when MT 70 is in a dead zone which prevents a user from unlocking his phone for use while in the dead zone. As yet another example, disablement may occur by the network or device flagging on a feature that disables the send/receive keypad on MT 70.

**[0055]** In the previous embodiments, except as to establishments that may be mandated by applicable laws to be included on the dead zone list which would need to be included on the list, the network may generate the dead zone list of hospitals, movie theaters, performing arts halls, churches, or other places where the use of cell phones may interfere with the public enjoyment, health, welfare, or safety, possibly based upon publicly available information. In another embodiment, if the establishment is listed on the dead zone list by default, unless it is one of the mandated establishments, the establishment may have the option to elect to be dropped from the list so as to allow MT 70 to be used in its establishment. For example, a restaurant that may be included on the dead zone list by default may elect to be dropped from the list in order to allow its customers to use MT 70 in its establishment. As yet another embodiment, any establishment that may not be included on the default dead zone list may have the option to elect to be included on the dead zone. For example, a store or a football stadium may request to be included on the dead zone list in order to prevent the use of MT 70 from disturbing its patrons. As yet another example, inclusion of an establishment on the dead zone list may be by way of a service offering provided by the service provider. The service may be offered at no charge to an establishment or may offered on a subscription fee basis. With this service, an establishment may elect to have their establishment included on the dead zone list by subscription to the service.

**[0056]** FIG. 11A shows an illustrative embodiment of this disclosure comprising a wireless device 1120 and an external utility 170. Wireless device 1120 comprises a processor 1112 and a memory 1130. External utility comprises a memory 1172 for storing instructions for execution by processor 1112 or by an external processor. A processor (not shown) may be associated with memory 1172 to execute instructions stored in the memory. The instructions may be configured to execute control instructions of general purpose operating system 1174 and control applications 1180.

**[0057]** Processor 1112 may be hardware and software configured to process instructions. The processor may be implemented in any number of ways. Such ways include, by way of example and not of limitation, digital and/or analog processors such as microprocessors and digital-signal processors (DSPs); controllers such as microcontrollers; software running in a machine; programmable circuits such as Field Programmable Gate Arrays (FPGAs), Field-Programmable Analog Arrays (FPAAs), Programmable Logic

Devices (PLDs), Application Specific Integrated Circuits (ASICs), any combination of one or more of these, and so on. Processor associated with external utility 1170 may be a server class processor, or other processor configured for executing control instructions associated with general purpose operating system 1174 and control applications 1180.

[0058] Memory 1130 may be any physical device capable of storing information temporarily or permanently. Memory may be implemented in any number of ways. Such ways include, by way of example and not of limitation, nonvolatile memories (NVM), read-only memories (ROM), random access memories (RAM), any combination of these, etc. Memory 1130 may include programs containing instructions for execution by processor 1112 or a processor external to the wireless device. The instructions perform the functions described in this disclosure including performing protocols, decision making analytics, and so on. In addition, memory 1130 may store rules, configurations, data, etc. Memory 1172 of external utility 1170 may be a server class memory, or other memory configured for storing control instructions associated with general purpose operating system 1174 and control applications 1180.

[0059] At least some of the software and data structures stored in the memory 1130 of the wireless device 1120 implements a general-purpose operating system 1132 that functionally organizes the wireless device 1120. The general-purpose operating system 1132 may be a type of operating system, that is capable of executing a variety of types of software applications, including applications related to wireless device control.

[0060] The general purpose operating system 1174 of external utility 1170 may be a type of operating system that is capable of executing a variety of types of software applications, including applications related to wireless device control. It will be understood that a general purpose operating system includes operating systems that, while capable of executing a variety of software applications, may be configured for special-purpose applications in any particular embodiment.

[0061] At least another part of the software and data structures in the memory 1130 of the wireless device 1120 stores a control application 1180 that is utilized to control external utility functions as disclosed herein.

[0062] At least another part of the software and data structures in the memory 1172 of the external utility stores a control application 1180 that is utilized to control wireless device functions as disclosed herein.

[0063] The control application 1140 of wireless device 1120 may include a wireless device subsystem 1142, a biometric operator module 1150, and a system status information module 1152. The wireless device subsystem 1142 of wireless device 1120 may include a system automation module, a dead zone (DZ) register 1146, and an override switch 1148.

[0064] The control application 1180 of external utility 1170 may include a wireless device subsystem 1182, a dead zone (DZ) service 1190, a dead zone (DZ) register 1192, a biometric operator service 1196, and a system status information module 1194. The wireless device subsystem 1182 of external utility 1170 may include a system automation control module 1184, a dead zone (DZ) register 1186, and an override switch 1188.

[0065] The wireless device subsystem 1142 of wireless device 1120 may be hardware and software configured to

monitor and control the wireless device. The wireless device subsystem 1142 of wireless device 1120 is also electrically coupled to, and provides control signals to wireless device subsystems such as sensors 1110 (or other subsystems, e.g., camera operation, scanning operation, texting, emailing, internet connectivity, etc.) that implement image capture, motion, wireless communication, internet browsing, and/or other function control. In one illustrative embodiment, the wireless device subsystem 1142 of wireless device 1120 is electrically coupled to one or more sensors 1110 onboard the wireless device as explained below. Image data, system status data, and/or other data may be detected by sensors or collected, under the direction of wireless device subsystem 1142 of wireless device 1120 for processing by the wireless device subsystem 1142 of wireless device 1120. Illustratively, the wireless device subsystem 1142 of wireless device 1120 may be configured to control the operation of the lower level systems of wireless device as explained below.

[0066] Alternatively, control of the lower level systems of wireless device may be by wireless device subsystem 1182 of external utility 1170, or by both the wireless device subsystem 1182 of external utility 1170 and the wireless device subsystem 1142 of wireless device 1120. The wireless device subsystem 1182 of external utility 1170 may be hardware and software configured to monitor and control the wireless device from an external location.

[0067] The DZ register 1146 of the wireless device subsystem 1142 of wireless device 1120 may be a portion of memory 1130 that stores locations in which a function of the wireless device should be disabled or modified in order to adapt to the requirements specified for the location. In another illustrative embodiment, the DZ register 1186 of wireless device subsystem 1182 of external utility 1170 may store locations in which a function of the wireless device should be disabled or modified in order to adapt to the requirements specified for the location. In another embodiment, the DZ register 1192 of the external utility 1170 may store locations in which a function of the wireless device should be disabled or modified in order to adapt to the requirements specified for the location. In another embodiment, combinations of DZ registers may be used according to this disclosure. For example, DZ register 1186 may contain dead zone locations on the network level and DZ register 1146 may contain dead zone locations on the wireless device level customized for a particular wireless device or user. DZ register 1192 may contain dead zone locations useable by a DZ service 1190. For example, a communication service provider for the wireless device may customize DZ register 1146 and DZ register 1186 in accordance with restrictions and permissions set by the service provider; while DZ register 1192 may be dead zone locations for which restrictions and permissions are set by a specific DZ service 1190. For instance, if the wireless device is associated with a firearm as per the examples below, a firearm bureau may operate the DZ service 1190 and use the DZ register 1192 for dead zone locations applicable to that service while the provider of the communication service may control the dead zone locations in DZ register 1186.

[0068] Dead zone locations may be locations in which the functionality of one or more features of a wireless device may be prohibited. Where, for example, the dead zone is a location in which all voice communications are prohibited, a wireless device in such a dead zone location may by the teachings of this disclosure cause the cellular and voice over

IP (VOIP) functions of the wireless device to be disabled. However, the other communication features of a wireless device such as text messaging or emailing or internet browsing may still be enabled and so be allowed. In this example, some but not all communication functionalities of a wireless device may be disabled by the teachings of this disclosure. In another example, all communication functionality of a wireless device may be disabled during the duration of time that the wireless device is in the dead zone. For instance, if the dead zone is a location where a wireless device should not be used, the communication features of the wireless device may be disabled.

**[0069]** The teachings of this disclosure also permit the functionalities of a wireless device to be modified without disablement. For instance, a wireless device that is approaching a dead zone may be modified by the teachings of this disclosure so that the user is aware that he is approaching a dead zone. For instance, the teachings of this disclosure may cause a communication signal to the smart phone to become weaker and weaker the closer the wireless device gets to the dead zone. This may cause the wireless device to change direction to avoid the dead zone to avoid the disablement of functionalities. In another example, a dead zone may permit a wireless device to render displays on a screen of the wireless device but at an intensity level that is less annoying to others on location. The teachings of this disclosure may modify the intensity settings of the wireless device to allow this to happen.

**[0070]** The wireless device subsystem **1142** of wireless device **1120** may include an override switch **1148**. The override switch may be hardware and software configured to override the control of the wireless device as explained below. Where, for instance, a wireless device enters a dead zone, a control signal from system automation control module **1184** of wireless device **1120** may be applied to the override switch **1148**. The output from the override switch **1148** may override control of the wireless device and disable the functionalities that are not permitted by the wireless device while in a dead zone.

**[0071]** Alternatively, where control of the lower level systems of wireless device may be by wireless device subsystem **1182** of external utility **1170**, a control signal from system automation control module **1184** of external utility **1170** may be applied to an override switch **1188**. The output from the override switch **1188** may override control of the wireless device and disable the functionalities that are not permitted by the wireless device while in a dead zone.

**[0072]** In operation, image, system status, or other data may be collected by the wireless device, the external utility **1170**, or both. And the wireless device subsystem **1142** of wireless device **1120**, the wireless device subsystem **1182** of external utility **1170**, or both in turn issues appropriate control signals to lower level systems of the wireless device to control their performance (such as disable function of the wireless device).

**[0073]** The biometric operator module **1150** may be hardware and software configured to calculate one or more biometric data or metrics, determine therefrom identity indicia on the operator currently using the wireless device, and based on the identity indicia, enable or disable functionality of the wireless device or services provided to the wireless device as described herein. Biometric data or met-

rics may include one or more of data samples, models, fingerprints, similarity scores and verification or identification data.

**[0074]** Biometric data or metrics may be used to authenticate a user of the wireless device for purposes such as identification and access control. Biometric operator monitor may employ a biometric identification technique such as face recognition, fingerprint identification, hand geometry biometrics, retina scan, iris scan, signature, voice analysis, and so to authenticate a user and access control. For example, if the biometrics of an operator do not match the biometrics of an authorized wireless device operator encoded in the memory **1130** (e.g., the operator is not the registered user of the wireless device), the biometric operator module may not enable the wireless device or if the wireless device is enabled, the biometric operator module may disable the wireless device.

**[0075]** Alternatively, external utility **1170** may include a biometric operator service **1196**. Biometric operator service may be server class hardware and software configured to calculate one or more biometric data or metrics, determine therefrom identity indicia on the operator currently using the wireless device, and based on the identity indicia, enable or disable functionality of the wireless device or services provided to the wireless device as described herein. Alternatively, biometric operator service may be non-server class hardware and software.

**[0076]** Alternatively, if the operator is not the registered user of the wireless device, the biometric operator module may perform one or more other sequences, such as a sequence to determine, notwithstanding the operator not being the registered user of the wireless device, whether the operator is someone otherwise authorized to use the wireless device. For example, in the illustrative embodiment of FIG. **11A**, a cloud service may be provided comprising a registry of biometric or other data on law enforcement officers. The biometric operator module may provide to the cloud service the biometric or other data on the person seeking to use the wireless device. The cloud service may then perform a set of instructions to determine whether the provided biometric data of the intended user matches the biometric data of a law enforcement officer. If there is a match, the cloud service may communicate to the biometric operator monitor to provide control instructions to enable the wireless device for use by the intended user. A biometric operator service **1196** in memory **1172** may provide this service of controlling the enable/disable functionality of the wireless device or services provided by the network to the wireless device based upon biometric data.

**[0077]** The system status information module **1152** may be hardware and software configured to provide system status information that may include data on why a wireless device remains disabled or functions of the wireless device remain disabled notwithstanding the desire of the operator to use the wireless device, information on the condition of the wireless device, instructions on what an operator may do in order to enable the firearm, and so on. For example, the status data may indicate that the biometric recognition failed; try again. Or the status data may indicate that the wireless device is in a dead zone; move to another location. The status data may also indicate that the power source is low; recharge or change battery. Other information may also be provided.

**[0078]** To provide feedback to an operator on the system status information, the electronic control system may also include a speaker, to issue voice prompts, etc. The electronic control system may also include visual gauges like a gauge to indicate the amount of power left and a gauge that changes in a condition such as changing a color, such as green, when a function of a wireless device is enabled according to this disclosure, and another color, such as red, when a function of the wireless device is enabled.

**[0079]** As depicted in FIG. 11B, touch-sensitive screen 1114 may display a dashboard of one or more functions of the wireless device that are controlled by the system automation module 1144 of the wireless device 1120, the system automation control module 1184 of the external utility 1170, or both. The dashboard provides enablement/disablement/modified indicia along with a script. The script may be a program that operates on the external utility and wireless device, as the case may be. Illustrative functions of the wireless device controlled by this disclosure illustrated on the dashboard are elements 1125, 1123, and 1127 associated with disablement by the wireless device, disablement by the external utility, and a modification of the functionality by both wireless device and external utility according to this disclosure. In the case of element 1127, a script would modify the performance of the GPS navigation system. Since in this example, a script from both external device and wireless device would apply, the script with the higher priority would apply to control the modification of the indicated function.

**[0080]** FIG. 11C depicts a logic map for enablement/disablement/modification of a wireless device by wireless device subsystem 1182 and wireless device subsystem 1142 (e.g., a logic map distributed across the wireless device 1120 and external utility 1170). As indicated, if both network and wireless device enable a function of the wireless device, the function will be enabled. If any one or both network and wireless device disable a function of the wireless device, the function will be disabled. If either network or wireless device is enabled and the other of network and wireless device is configured to run a script or to modify the functionality of the wireless device, the script will execute and provide control signals for controlling or modifying the function. If both network and wireless device invoke scripts or modification, then the script or modification that has been ascribed the higher priority will execute and provide control signals for controlling or modifying the function.

**[0081]** A system status information service 1194 in external utility 1170 may provide system status information to the wireless device for controlling the enable/disable functionality of the wireless device or services provided by the network to the wireless device.

**[0082]** A dead zone (DZ) service 1190 in external utility 1170 may provide dead zone services to the wireless device for controlling the enable/disable functionality of the wireless device or services provided by the network to the wireless device. For example, a third party may set up a dead zone subscription service whereby churches, restaurants, and so on may subscribe to have control signals sent to control functionality in wireless devices that are on the premises of the subscriber.

**[0083]** The wireless device may include a touch-sensitive screen 1114 to allow a wireless device operator to interface with the wireless device. The touch-sensitive screen may be a computer display screen that is also an input device.

Illustratively, the touch-screen may be integrated with the electronic control system of the wireless device to allow an operator of the wireless device to provide input commands to the wireless device and to scroll, navigate, and zoom image, system status, and other data rendered on the touch-sensitive screen. Alternatively, any enable/disable control interface may be used in place of the touch-screen.

**[0084]** The screens may be sensitive to pressure. A user may interact with the wireless device by touching pictures or words on the screen. The touch-sensitive screen 1114 may be configured to visually display information and to received input, including touches and gestures entered by an operator. Alternatively, the touch-sensitive screen 1114 may be provided by the display of a wireless mobile device. Illustrative examples of wireless mobile devices include tablet computers, smartphones, and certain portable media players that execute general-purpose operating systems. Alternatively, the touch-sensitive screen 1114 may be provided by the display of an external utility configured to wirelessly communicate with the wireless device of this disclosure. The wireless communication of the wireless mobile device or external utility with the wireless device may be over a wireless network 1230 described below in connection with FIG. 12 below. Alternatively, the wireless mobile devices, external utility, or other enable/disable control interface, such as a monitor, may be hardwire tethered to the wireless device of this disclosure through communication ports.

**[0085]** As described above, the touch-sensitive screen may allow the image, system status, or other data to be displayed on a user interface (UI) on the touch-sensitive screen 1114 (FIG. 11A), and may receive control input indicating desired motion and/or other function control via the UI, such as when firearm operator control is permitted in the embodiment described below. The desired motion may be scrolling, navigating, and zooming image, system, and other data rendered on the touch-sensitive screen. This control input may be passed to the network 1230 for transmission back to the external utility 1170 (FIG. 11A) (which may be a server 1240) where permitted. The network 1230 may be a public or private network, or combination of both.

**[0086]** The touch-sensitive screen may also enable an operator of the wireless device to pass data to the network through wireless network interface 1116 for transmission back to an external utility 1170 (FIG. 11A) over a wireless network, when permitted. The touch-sensitive screen may also render on the display of the touch-sensitive screen data received over the wireless network from a cloud service or other external utilities over the network. For instance, data streamed into the wireless device for rendering on the touch-sensitive screen (or for broadcast audibly) may include data on why one or more features of a wireless device remains disabled, data requiring the operator to perform certain steps before enabling the wireless device, data resulting from a biometric check done by a cloud server as previously described, and so on.

**[0087]** The external utility may provide a control signal to wireless network interface 1116 for use by wireless device in controlling the firearm as disclosed herein.

**[0088]** An operator may be permitted to access data, such as image, system status, other data, update data, and/or confirm data, and so on. For example, an operator may have permission to access system status data in order to understand why a wireless device functionality has been disabled.

The dashboard depicted in FIG. 11B illustrates one way in which such information may be made available to an operator.

**[0089]** A service provider may have permission to update status data over a network as disclosed herein. In one illustrative example, the service provider may be a bureau, such as a government entity enabled with permissions to update status information. A law enforcement officer may have permission enable a wireless device that is not his own. Permission may be illustratively granted using a cloud service including a registry on biometric data as previously explained.

**[0090]** Permission may be given a user of the wireless device in other situations after a condition has triggered the functionality of the wireless device to be disabled. For example, a user may have permission to make a 911 call even in a location where calling is prohibited or restricted. In another example, a law enforcement officer entering a dead zone in hot pursuit of armed robbers may, for example, using permissions, over-ride the disable of the wireless device to allow one or more functionalities to be used. Permissions may be encoded in the memory of the wireless device or stored in a cloud service which may include a registry of persons with permission to operate the wireless device.

**[0091]** The wireless device may also include an enable/disable control interface through which a remote operator or service may monitor and control the wireless device as described herein. For example, the wireless device subsystem 1142 of the wireless device may include an interface through which a remote operator or service may monitor and control the wireless device as described herein.

**[0092]** The wireless device may be provided with a microphone for the electronic control system to receive voice commands, such as by an operator, like “try again” or “reboot”, and so on.

**[0093]** In another embodiment, a plurality of wireless devices may be tethered or wirelessly connected to an off boarded computing device. The computing device may serve the plurality of wireless devices in one or more ways, such as by validating the operator, providing services, and so forth. A plurality of wireless devices may be wirelessly connected to a remote computing device for purposes of monitoring and controlling the wireless device in the dead zone area, such as by disabling a functionality of the wireless device when an operator is entering a dead zone.

**[0094]** FIG. 11A shows a wireless device may further include sensors 1110. Sensors 1110 may comprise an image capture sensor, another sensor, or a combination of both. The image capture sensor may be hardware and software configured to capture an image. Image capture sensors typically include one or more light sensors. A light source may also be included to emit light to be reflected off an object. The light sensors capture and translate the reflected light into electrical signals. The image captured may be a photo image. For example, the light sensors may be a high-pixel resolution CCD (charge coupled device) chip and it and associated hardware may be used for generating digital images. The software for processing the captured images may reside in the memory 1130 or a section of memory. Alternatively, the image capture sensors may be provided with a processor and a memory for storing and executing this image processing software.

**[0095]** Other sensors may include heat, location accelerometer, a gyroscope, a magnetometer, a proximity sensor, a gravity sensor, a linear accelerometer, and so on. Additional sensors may include light sensor, camera sensors, microphone sensors, touch sensors, pressure sensor, temperature sensor, humidity sensor, and so on.

**[0096]** Illustratively, the wireless network interface 1116 may comprise transceiver circuitry and software for sending and receiving packets over a wireless network (e.g., an IEEE 802.11 WLAN). Alternatively, the transceiver may be hardware and software configured to transmit data to and from the electronic control system and a network or an external device including Wi-Fi, blue tooth CDMA, and so on, that enables a wireless communication link for between the electronic control system and an external device.

**[0097]** In an alternative embodiment, the wireless network interface 1116 may be combined with or replaced by a hardwire connect for electrically connecting the electronic control system to the network by wire, such as one or more ports and associated circuitry and software that allow wired communication between the electronic control system and an external device (e.g., an Ethernet connector, an RS232 connector, a USB or other wire connector.)

**[0098]** A hardwire connect may be used, for example, to tether a wireless device to another wireless device to enable the functionality of the wireless device to assist, augment, enhance, or complement functionality that is provided by the wireless device. In one example, the tether permits the wireless network interface of the smart phone to be used by the electronic control system to communicate with external devices or a network. For example, a smart phone received and held in a pocket of a garment worn by the operator may be tethered to the wireless device so as to allow the smart phone to communicate with the wireless device to perform the functionalities of this disclosure. For example, the touchscreen of the display of the mobile device may provide the touch-sensitive screen 1114 of the wireless device. In another example, the wireless network interface of the smart phone may provide the hardware and software to establish a wireless communication link with a network.

**[0099]** The wireless network interface 1116, hardware connect, or both may enable any computing device to be electrically connected to the wireless device of this disclosure. By computing device is meant servers, intermediary servers, personal computers, cellular phones, smart phones, wireless computers, wireless lap-top computers, mobile devices such as tablet computers, pad computers, personal digital assistant, wireless sensors or networks of sensors, such as mesh network sensors, and so on may be in electrical communication with to provide functionality to the electronic control system.

**[0100]** In another illustrative embodiment, a wireless mobile device such as a smartphone or other computing device may be the wireless device of this disclosure. In this embodiment, the smartphone may provide the processor, memory, and wireless network interface functionalities of the electronic control system according to this disclosure. The battery of the smartphone may provide power for the firearm subsystem or enhance a power system provided the firearm for operating the firearm subsystem.

**[0101]** FIG. 12 shows an illustrative embodiment system 1210 implementation of FIG. 11 of this disclosure comprising a wireless device 1220, a network 1230, and an external utility 1240.

[0102] Wireless device **1220** has been previously described. Network illustratively may include access point **1232**, base station **1238**, a cloud **1234**, and a gateway **1236**. Network may include an access point or base station or both. Networking may also occur on a peer-to-peer basis where possible.

[0103] Access point **1232** is a station that transmits and receives data (sometimes referred to as a transceiver). An access point connects users to other users within the network and also can serve as the point of interconnection between the WLAN and a fixed wire network. A base station is a fixed point of communication for customer cellular phones on a carrier network. A cloud is a network of computers through which data passes between two end points. A gateway **1236** is a network node that connects two networks using different protocols together.

[0104] External utility **1240** comprises one or more programmed computers that may be connected to the wireless device **1220** wirelessly or by wired connection in order to allow for the exchange of data and control signals between the electronic control system and the external utility through wireless network interface **1116** and/or hardware connection as previously explained. The external utility of this disclosure may be a cloud server. A server may be any computer configured to serve the requests of client programs running on the same or other computers on a network. The computer of the external utility may be a host computer configured to serve the requests of one or more client programs residing in the safety disarm module. Alternatively, the computer of the external utility may serve a client residing on the external utility or on some other computer to which the external utility may be connected. Depending on the computing service that the server is configured to offer, the server may include one or more of a file server for storing and making files accessible for reading and writing to the client, a print server that manages one or more printers, a network server that manages network traffic, a mail server that manages mail on a network, a database server that allows clients to interact with a database, a firearm server for managing firearm records, and so on. The server may also be in communication with one or more other servers that may include one or more of the foregoing or other servers. The foregoing and servers may provide a service to the firearm operator. For instance, the print server may enable a firearm operator to print an image of a target or print information on why the firearm was not armed, or information on the use of the firearm such as day and time of use, time of firing, number of firings, location, and so on. Sensors associated with the firearm may track movement of the firearm for printing by the print server for investigative, historical, archival, or other purposes.

[0105] The computer of the external utility may be any computer (e.g., end user device or server) including servers, intermediary servers, personal computers, cellular phones, smart phones, wireless computers, wireless lap-top computers, mobile devices such as tablet computers, pad computers, personal digital assistant, and wireless sensors or networks of sensors, such as mesh network sensors. These examples are not intended to be limiting, and the present disclosure is not limited to these examples of computing device. In one illustrative embodiment, the computing device may be a user equipment such as a cellular phone, a smart phone, or other device, such as a tablet or a personal digital assistant containing a multi applications processor configured to

execute a mobile application. In other embodiments, any computing device configured to execute an application to provide a data service according to this disclosure may be used as the computing device of this disclosure.

[0106] The external utility **1240** in FIG. **12** may be configured to serve the control application in controlling the operation of the wireless device and in supporting the operator of the wireless device. In one example, the illustrative memory map on dead zones may reside in the wireless device. Alternatively, the map may reside on an external utility, such as a cloud server. Alternatively, a first map may reside on the external utility and a second map on the wireless device. The maps may be identical, similar, complementary, and so on.

[0107] The cloud server may allow for dead zone services at a level more complicated and sophisticated than possible on the wireless device to take place in order to make the enable/disable of this disclosure. Control application of this disclosure, for example as illustrated in FIG. **11A** may comprise software configured to create a communication link between the wireless device and the cloud server so as to allow the electronic control system and the service to communicate. The control application may be downloadable software, embedded software, and so on. In another example, the cloud server may allow for complex biometric metrics to be generated for use by the biometric operator monitor of the wireless device of this disclosure. This may make the enabling of a wireless device in a dead zone, for example, according to this disclosure based on the biometric identity of the operator more robust and effective.

[0108] In another example, the cloud server may allow for system status data to be generated for use by the system status information module **1152**. This may make the feeding of system status data to the wireless device of this disclosure more robust and effective.

[0109] In another embodiment, as shown in FIG. **11A**, an illustrative memory map for operation of the wireless device may reside on a cloud server. Data on the wireless device, wireless device registrant, registration data, permitted wireless operators, wireless operator recognition, date of use, location of use, dead zone restrictions, and so on may be managed by way of a service on a cloud server and used to arm or disarm a firearm, stream data, provide guidance or coaching to an operator, and so on.

[0110] FIG. **13A** depicts an illustrative dead zone control architecture **1301** for wireless device. In wireless devices, there may be many controllers which are responsible for different functions of a wireless device or for controlling the wireless device on different levels. To perform a given wireless function the wireless device controllers (e.g. Start/Resume & Stop/End **1334**, Path Generation & Control **1336**, Automatic Path Control System **1338**, Other System **1339**) are activated and connected in a certain way. A system automation module **1332** provides control signals to the device controllers responsive to external commands **1350**, system status **1352**, and sensor information **1354**. The specific ways system automation module **1332** does this are known in art and a matter of design choice.

[0111] A wireless device subsystem **1310** of this disclosure (either wireless device subsystem **1142** in wireless device **1120**, or wireless device subsystem **1182** in external utility **1170**, or both) applies control signals to system automation module **1332** in order to enable, disable, or modify one or more functionalities of the wireless device in

accordance with this disclosure. Control signals may be generated by the wireless device subsystem 1310 responsive to the wireless device approaching a dead zone, entering a dead zone, and so on. The outputs of the controllers are illustratively applied to a switch 1340 for generating an actuator command 1344 which may be under the influence of an inner loop control that controls actuators 1346. Actuators 1346 may be an electro-mechanical, electrical, or software configuration that generates an actuator response in response to the actuator command 1344. An electromechanical actuator may be the mechanism that causes a camera lens to zoom and out and to focus and take a picture. An electrical actuator may be light sensor that flashes in response to the actuator command 1344. A software actuator may be a switch that turns a function of a wireless device on or off. For instance, the software actuator may turn off wireless network interface 1116. Alternatively, it may turn off email, text, or sms messaging. Other illustrative functions of the wireless device are depicted in FIG. 11B.

[0112] Wireless device subsystem 1310 may also include an override switch 1314 to generate a control signal to override control signals that are otherwise generated by switch 1340.

[0113] A DMZ register may be used by the system automation control module 1312 to determine whether or not the wireless device is approaching or entering or leaving a dead zone location.

[0114] In operation, the system automation control module 1312 monitors the location of the wireless device. As a wireless device approaches a dead zone location, the system automation control module 1312 may generate control signals for modifying the wireless device controllers (e.g. Start/Resume & Stop/End 1334, Path Generation & Control 1336, Automatic Path Control System 1338, Other System 1339) are activated and connected in a certain way. For example, the system automation control module may generate scripts as shown in FIG. 11B to change the performance of the wireless device controllers. For example, the script may cause the signal of the voice call to become weak, or cause the internet signal to become weak, or cause the illumination of the display of the wireless device to become dimmer. The closer the wireless device is to the dead zone location, the more the control signals generated by the system automation control module 1312 may cause the performance of the actuators to change. In this way, the operator of the wireless device may change course to steer clear of a dead zone location or become aware that he is approaching a location where one or more functionalities of his wireless device may be disabled.

[0115] When the system automation control module 1312 detects that a wireless device is entering a dead zone, the system automation control module 1312 may disable a functionality of the wireless device. The disable control signal may be generated by override switch 1314 or by control signals that the system automation control module 1312 applies to the system automation module 1332.

[0116] FIG. 13B shows illustrative dead zone control architecture for wireless device of FIG. 13A incorporated in an external utility. The elements shown are generally as described in FIG. 11A adapted for use with wireless device of FIG. 13A according to the teachings of this disclosure. FIG. 13D shows illustrative dead zone service in a separate external utility. Alternatively, a single external utility may integrate the functions illustrated in FIGS. 13B and 13D or

the functionalities may be distributed across a plurality of external utilities. FIG. 13C illustrates a memory map that may be stored in DZ register depicted in FIG. 13B. The memory map may include indicia such as wireless device, device registration, registration date, permitted users, user recognition, location of use, dead zone areas, and functionalities to be disabled. These functionalities may be the actuators 1346 in FIG. 1A and depicted in FIG. 11B.

[0117] The specific functionality to be disabled may be set by rules programed into the system automation control module 1312. For instance, the rules may cause system automation control module 131 to disable all communication functionality or just voice calling.

[0118] The modification of the behavior of the wireless device may be in accordance to rules such as depicted in FIG. 11C.

[0119] FIG. 14A depicts an illustrative dead zone control architecture 1401 for wireless device for a firearm. In this wireless devices for a firearm, one or more controllers may be provided, the controllers being responsible for different functions of the wireless device or for controlling the wireless device on different levels. In this embodiment, the firearm is controlled by the wireless device by wireless device controllers (e.g. Firearm Start/Resume & Stop/End 1434, Path Generation & Control 1436, Automatic Path Control System 1438, Other System 1439) are activated and connected in a certain way. A system automation module 1432 provides control signals to the device controllers responsive to external commands 1450, system status 1452, and sensor information 1454.

[0120] A wireless device subsystem 1410 of this disclosure (either wireless device subsystem 1142 in wireless device 1120 or wireless device subsystem 1182 in external utility 1170, or both) applies control signals to system automation module 1432 in order to enable, disable, or modify one or more functionalities of the wireless device in accordance with this disclosure. Control signals may be generated by the wireless device subsystem 1410 responsive to the wireless device approaching a dead zone, entering a dead zone, and so on. The outputs of the controllers are illustratively applied to a switch 1440 for generating an actuator command 1444 which may be under the influence of an inner loop control that controls actuators 1446. Actuators 1446 may be an electro-mechanical, electrical, or software configuration that generates an actuator response in response to the actuator command 1444. An electromechanical actuator may be a firearm subsystem (e.g., firearm subsystems, such as firearm latch controllers, transmission controllers, latch actuators, etc.) that implement motion and/or other function control as taught in Non-Provisional application Ser. No. 15/663,660 filed Jul. 28, 2017, titled "Safety Disarm for Firearm", Docket No. JL00900.016, which is also herein incorporated by reference. An electrical actuator may be light sensor that flashes in response to the actuator command 1444. A software actuator may be a switch that turns a function of a wireless device on or off. For instance, the software actuator may turn off wireless network interface 1116. Alternatively, it may turn off email, text, or sms messaging. Other illustrative functions of the wireless device are depicted in FIG. 11B.

[0121] Wireless device subsystem 1310 may also include an override switch 1414 to generate a control signal to override control signals that are otherwise generated by switch 1440.

[0122] A DMZ register may be used by the system automation control module 1412 to determine whether or not the wireless device is approaching or entering or leaving a dead zone location.

[0123] In operation, the system automation control module 1412 monitors the location of the wireless device. As a wireless device approaches a dead zone location, the system automation control module 1312 may generate control signals for modifying the wireless device controllers (e.g. Firearm Start/Resume & Stop/End 1434, Path Generation & Control 1436, Automatic Path Control System 1438, Other System 1439) are activated and connected in a certain way. For example, the system automation control module may generate scripts as shown in FIG. 11B to change the performance of the wireless device controllers. For example, the script may cause the signal of the voice call to become weak, or cause the internet signal to become weak, or cause the illumination of the display of the wireless device to become dimmer. The closer the wireless device is to the dead zone location, the more the control signals generated by the system automation control module 1412 may cause the performance of the actuators to change. In this way, the operator of the wireless device may change course to steer clear of a dead zone location or become aware that he is approaching a location where one or more functionalities of his wireless device may be disabled.

[0124] When the system automation control module 1412 detects that a wireless device is entering a dead zone, the system automation control module 1412 may disable a functionality of the wireless device. The disable control signal may be generated by override switch 1414 or by control signals that the system automation control module 1412 applies to the system automation module 1432.

[0125] FIG. 14B shows illustrative dead zone control architecture for wireless device of FIG. 14A incorporated in an external utility. The elements shown are generally as described in FIG. 11A adapted for use with wireless device of FIG. 14A according to the teachings of this disclosure. FIG. 14D shows illustrative dead zone service in a separate external utility. Alternatively, a single external utility may integrate the functions illustrated in FIGS. 14B and 14D or the functionalities may be distributed across a plurality of external utilities. FIG. 14C illustrates a memory map that may be stored in DZ register depicted in FIG. 14B. The memory map may include indicia such as firearm, device registration, registration date, permitted users, user recognition, location of use, dead zone areas, and functionalities to be disabled, other. These functionalities may be the actuators 1346 in FIG. 11A and depicted in FIG. 11B.

[0126] The specific functionality to be disabled may be set by rules programed into the system automation control module 1412. For instance, the rules may cause system automation control module 1412 to disable all communication functionality or just voice calling.

[0127] The modification of the behavior of the wireless device may in accordance to rules such as depicted in FIG. 11C.

[0128] FIG. 15A depicts an illustrative dead zone control architecture for wireless device, such as a drone. In unmanned aerial systems, there are many controllers which are responsible for different parts of a flight mission or for controlling the aircraft on different levels. To perform a given flight mission the flight controllers (e.g. Takeoff & Landing 1534, Trajectory Generation & Control 1536, Auto-

matic Flight Control System 1538, and Other System 1539) may have to be activated and connected in a certain way. To ensure the correct switching a superior system automation logic may be needed. A system automation module 1532 provides control signals to the device controllers responsive to external commands 1550, system status 1552, and sensor information 1554.

[0129] A wireless device subsystem 1510 of this disclosure (either wireless device subsystem 1142 in wireless device 1120 or wireless device subsystem 1182 in external utility 1170, or both) applies control signals to system automation module 1532 in order to enable, disable, or modify one or more functionalities of the wireless device in accordance with this disclosure. Control signals may be generated by the wireless device subsystem 1510 responsive to the wireless device approaching a dead zone, entering a dead zone, and so on. The outputs of the controllers are illustratively applied to a switch 1540 for generating an actuator command 1544 which may be under the influence of an inner loop control that controls actuators 15446. Actuators 1546 may be an electro-mechanical, electrical, or software configuration that generates an actuator response in response to the actuator command 1544. An electromechanical actuator may implement motion and/or other function control, e.g. the flaps or gear. These actuators have a direct influence on the aircraft's envelope, which can be based on aerodynamic or structural limits. An electrical actuator may be light sensor that flashes in response to the actuator command 1544. A software actuator may be a switch that turns a function of the wireless device on or off. For instance, the software actuator may turn off wireless network interface 1116. Alternatively, it may turn off camera taking. Other illustrative functions of the wireless device are depicted in FIG. 11B.

[0130] Wireless device subsystem 1510 may also include an override switch 1514 to generate a control signal to override control signals that are otherwise generated by switch 1540.

[0131] A DMZ register may be used by the system automation control module 1512 to determine whether or not the wireless device is approaching or entering or leaving a dead zone location.

[0132] In operation, the system automation control module 1512 monitors the location of the wireless device. As a wireless device approaches a dead zone location, the system automation control module 1512 may generate control signals for modifying the wireless device controllers (e.g. Takeoff & Landing 1534, Trajectory Generation & Control 1536, Automatic Flight Control System 1538, Other System 1539) are activated and connected in a certain way. For example, the system automation control module may generate scripts as shown in FIG. 11B to change the performance of the wireless device controllers. For example, the script may cause operation of the aircraft in the specified envelope, it may adjust certain limits within the flight controllers to steer the wireless device away from the dead zone.

[0133] The closer the wireless device is to the dead zone location, the more the control signals generated by the system automation control module 1512 may cause the performance of the actuators to change. In this way, the wireless device may change course to steer clear of a dead



zone location or become aware that he is approaching a location where one or more functionalities of his wireless device may be disabled.

[0134] When the system automation control module 1512 detects that a wireless device is entering a dead zone, the system automation control module 1512 may disable a functionality of the wireless device, such as a camera. This may prohibit, for example, a drone from taking pictures of people in the privacy of their properties. Some camera functionality may still be permitted such as line of site in order to enable the drone to continue flight unhindered. The disable control signal may be generated by override switch 1514 or by control signals that the system automation control module 1512 applies to the system automation module 1532.

[0135] FIG. 15B shows illustrative dead zone control architecture for wireless device of FIG. 15A incorporated in an external utility. The elements shown are generally as described in FIG. 11A adapted for use with wireless device of FIG. 15A according to the teachings of this disclosure. FIG. 15D shows illustrative dead zone service in a separate external utility. Alternatively, a single external utility may integrate the functions illustrated in FIGS. 15B and 15D or the functionalities may be distributed across a plurality of external utilities. FIG. 15C illustrates a memory map that may be stored in DZ register depicted in FIG. 15B. The memory map may include indicia such as firearm, device registration, registration date, permitted users, user recognition, location of use, dead zone areas, and functionalities to be disabled, other. These functionalities may be the actuators 1156 in FIG. 11A and depicted in FIG. 11B.

[0136] The specific functionality to be disabled may be set by rules programed into the system automation control module 1512. For instance, the rules may cause system automation control module 1512 to disable all communication functionality or just voice calling.

[0137] The modification of the behavior of the wireless device may in accordance to rules such as depicted in FIG. 11C.

[0138] FIG. 16A depicts a wireless device 1680 that is executing an augmented reality (AR) application 1682. Generally, augmented reality provides a live view of a physical, real-world environment whose elements are “augmented” by computer-generated information, such as visual, aural, and/or haptic information. The computer-generated information can be added to the live view or may mask portions of the live view. Additionally, the computer-generated information is typically spatially aligned with the real-world environment such that it is perceived as a part of the real-world environment.

[0139] The AR application 1682 may use input from a camera (not shown), microphone (not shown) or other input devices or sensors (not shown), to produce computer-augmented perceptual output, based on the data collected by such input devices or sensors. For example, video input taken by a camera can be displayed on a screen 1684 of the wireless device 1680 with additional computer-generated images added to the video in real time, to provide a “real world” image from the camera, augmented with the computer-generated images. Input from other sensors (not shown), such as magnetic field sensors, orientation sensors, and accelerometers can also be used to provide information on, e.g., the direction that a user is facing or moving, to help to generate an augmented reality scene.

[0140] Other forms of input, such as audio, may also be augmented through enhancement or addition of computer-generated content. Additionally, although the wireless device 1680 shown in FIG. 16A is depicted as being a mobile “smart phone”, other wireless devices, such as eyeglasses, headsets, headphones, haptic devices, or other output devices or combinations of such devices may be used in augmented reality applications.

[0141] While augmented reality shows great promise in a wide range of applications, including education, medicine, architecture, design, art, entertainment, and other fields, there are occasions where use of certain forms of augmented reality may be inappropriate. For example, a recently popular entertainment AR application called POKÉMON GO, published by Niantic, Inc. of San Francisco, Calif., encourages players to search real-world locations for AR characters that are displayed on a smart phone as being in the player’s real-world location. These characters may then be battled, captured, trained, etc., in real-world locations, using AR to depict the characters in the player’s real-world location. While the game has been very popular, and encourages physical activity (since players are encouraged to travel, generally by foot, to locations where certain of the AR characters can be found), there are real-world locations where playing the game would be inappropriate. For example, the game could be disruptive in places like classrooms, museums, theaters, or restaurants. The game could be disrespectful if AR creatures were depicted in places like cemeteries, places of worship, or places of great cultural significance. While some (e.g., educational) AR applications may be appropriate in some of these settings, others (e.g., entertainment AR applications) would be inappropriate, disruptive, and/or disrespectful. There may be settings (e.g., memorials) where no AR application should be used.

[0142] FIG. 16B depicts an illustrative dead zone control architecture for a wireless device that can use dead zone control to enable, disable, or modify access to AR functions. Because there may be a variety of AR-related functions that can be activated, deactivated, or modified, and it may be desirable to control these functions based on both the location and type of AR application educational AR applications may be appropriate in schools, while entertainment AR applications might not be), complex system automation logic may be used. AR services, including AR input services 1634, AR rendering services 1636, AR output services 1638, and other services 1639 may be provided as a set of components for use by AR applications. For example, the AR input services 1634 may control cameras and motion sensors, as well as providing complex scene and lighting understanding to provide visual scene input for use by an AR application. The AR rendering services 1636 may provide the ability to combine computer-generated visual content with visual content derived from the camera and other sensors, and the AR output services 1638 may provide access to devices such as a screen, headset, eyeglasses, etc. to output visual AR content. Further, similar services may be available for other sensory modalities (e.g., auditory, haptic, olfactory). An AR system interface 1632 provides control signals to the AR services responsive to external commands 1650 (e.g., from AR applications), system status 1652, and system information 1654. The specific ways in which the AR system interface 1632 does this are known in art and a matter of design choice.

[0143] A wireless device subsystem 1610 of this disclosure (either wireless device subsystem 1142 in wireless device 1120 or wireless device subsystem 1182 in external utility 1170, or both, as shown in FIG. 11A) applies control signals to AR system interface 1632 in order to enable, disable, or modify one or more functionalities of the wireless device in accordance with this disclosure. Control signals may be generated by the wireless device subsystem 1610 responsive to the wireless device approaching a dead zone, entering a dead zone, and so on. The outputs of the controllers are illustratively applied to a switch 1640 for generating an actuator command 1644 which may, in some embodiments, be under the influence of an inner loop control 1642 that controls actuators 1646. Actuators 1646 may be an electro-mechanical, electrical, or software configuration that generates a response to the actuator command 1644. An electromechanical actuator may be the mechanism that, for example, causes a camera lens to zoom in and out and to focus and take a picture. An electrical actuator may be light sensor that flashes in response to the actuator command 1644. A software actuator may be a switch that turns a function of a wireless device on or off, or that modifies a function of a wireless device. For instance, in the context of an AR system, a software actuator may send commands that cause the AR rendering services 1636 to reject requests to render AR objects in a real-world scene, cause the AR input services 1634 to reject requests to access a video stream, or cause the AR output services 1638 to output only to eyeglasses or headsets, and not to mobile phone screens. Additionally, in some embodiments, the actuators 1646 may be able to disable, enable, or modify communications functions, such as voice communications, email, text, or sms messaging, or other functions of the wireless device. Other illustrative functions of the wireless device are depicted in FIG. 11B.

[0144] Wireless device subsystem 1610 may also include an override switch 1614 to generate a control signal to override control signals that are otherwise generated by switch 1640.

[0145] A DMZ register may be used by the system automation control module 1612 to determine whether or not the wireless device is approaching or entering or leaving a dead zone location.

[0146] In operation, the system automation control module 1612 monitors the location of the wireless device. As a wireless device approaches a dead zone location, the system automation control module 1612 may generate control signals for modifying the AR services (e.g. AR input services 1634, AR rendering services 1636, AR output services 1638, other services 1639) are activated and connected in a certain way. For example, the system automation control module may generate scripts, similar to those shown in FIG. 11B, to change the performance of the AR services. For example, the script may cause rendered AR objects in a scene to become increasingly transparent, cause a video stream from a device camera to be output with decreasing focus or detail, cause certain types of AR applications (e.g., entertainment applications) to have decreased access to AR services, etc. In some embodiments, the closer the wireless device is to the dead zone location, the more the control signals generated by the system automation control module 1612 may cause the performance of the actuators to change. In this way, the operator of the wireless device may become aware that he is approaching a location where one or more functionalities of

his wireless device may be disabled, and may decide to avoid the dead zone location.

[0147] When the system automation control module 1612 detects that a wireless device is entering a dead zone, the system automation control module 1612 may disable or modify an AR-related functionality of the wireless device. The disable control signal may be generated by override switch 1614 or by control signals that the system automation control module 1612 applies to the AR system interface 1632.

[0148] FIG. 16C shows the illustrative dead zone control architecture 1601 for the wireless device of FIG. 16B, incorporated into an external utility 1661. The elements shown are generally as described in FIG. 11A adapted for use with wireless device of FIG. 16A according to the teachings of this disclosure. Similarly, FIG. 16E shows an illustrative dead zone service 1665, which provides dead zone services related to augmented reality in a separate external utility 1663. The dead zone service 1665 may be similar to the dead zone service discussed above as DZ service 1190, with reference to FIG. 11A. Alternatively, a single external utility may integrate the functions illustrated in FIGS. 16C and 16E or the functionalities may be distributed across a plurality of external utilities.

[0149] FIG. 16D illustrates a memory map that may be stored in DZ register 1616 depicted in FIG. 16B. The memory map may include indicia such as AR application, application registration, registration date, permitted users, application type, location of use, dead zone areas, and functionalities to be disabled (or enabled or modified), and other. These functionalities may, for example, correspond to the actuators 1646 in FIG. 16B.

[0150] The specific functionality to be disabled, enabled, or modified may be set by rules programed into the system automation control module 1612. For instance, the rules may cause system automation control module 1612 to disable AR rendering, to modify scene understanding in AR input services, or to modify other AR-related services. Additionally, the rules may cause the system automation control module 1612 to disable, enable, or modify communication functionality and/or voice calling.

[0151] The modification of the behavior of the wireless device may be in accordance to rules such as those depicted in FIG. 11C.

[0152] In accordance with some embodiments of the invention, augmented reality may be combined with other functions or embodiments that are described above. For example, augmented reality functions may be used with drone embodiments to automatically cover over, defocus, or pixelate views through residential windows, or views of sensitive private or government property, even when a drone is not actually flying over such property. Such residential or sensitive properties may, for example, be defined in the DZ registers of the various embodiments that are discussed herein. Similarly, augmented reality can be used in conjunction with firearm-related embodiments to highlight permitted targets, or to indicate as forbidden or to obscure forbidden targets.

[0153] FIG. 17A depicts an illustrative dead zone control architecture 1701 for a wireless device that can use dead zone control to enable, disable, or modify access to a variety of image, video, and/or audio (IVA) functions. Modernly, most mobile phones, for example, have sophisticated audio and video recording capabilities, as well as high-resolution

cameras, many of which can take good images, even in low light. Controlling access to these functions may, for example, permit audio and video recording to be disabled within a concert venue, while allowing still photos to be taken. As another example, still images and video could be disabled in private areas, such as dressing rooms, locker rooms, or restrooms. As yet another example, flash capabilities of a camera on a mobile device may be disabled within museums, places of worship, or other locations where flash photography may be inappropriate. There may be a variety of locations or conditions in which some or all IVA functions of a mobile device should be disabled or modified.

**[0154]** IVA functions, including image functions **1734**, video functions **1736**, audio functions **1738**, and other functions **1739** may be available on mobile devices, and may be used by a variety of applications that are available on mobile devices. For example, the image functions **1734** may provide access to still-camera input (and, in some embodiments, output) functions, such as taking pictures, adjusting zoom, lighting and exposure control, flash control, and so on. The video functions **1736** may control recording and playback of video, and the audio functions **1738** may control recording and playback of audio. An IVA system interface **1732** provides control signals to the IVA functions responsive to external commands **1750**, system status **1752**, and sensor information **1754**. The specific ways in which the IVA system interface **1732** does this are known in art and a matter of design choice.

**[0155]** A wireless device subsystem **1710** of this disclosure (either wireless device subsystem **1142** in wireless device **1120** or wireless device subsystem **1182** in external utility **1170**, or both, as shown in FIG. **11A**) applies control signals to IVA system interface **1732** in order to enable, disable, or modify one or more functionalities of the wireless device in accordance with this disclosure. Control signals may be generated by the wireless device subsystem **1710** responsive to the wireless device approaching a dead zone, entering a dead zone, and so on. The outputs of the controllers are illustratively applied to a switch **1740** for generating an actuator command **1744** which may, in some embodiments, be under the influence of an inner loop control **1742** that controls actuators **1746**. Actuators **1746** may be an electro-mechanical, electrical, or software configuration that generates a response to the actuator command **1744**. An electromechanical actuator may be the mechanism that, for example, causes a camera lens to zoom and out and to focus and take a picture. An electrical actuator may be light sensor that flashes in response to the actuator command **1744**. A software actuator may be a switch that turns a function of a wireless device on or off, or that modifies a function of a wireless device. For instance, in the context of an IVA system, a software actuator may send commands that cause the video functions **1736** to reject requests to record or display video, cause the image functions **1734** to defocus the camera lens or cause the audio functions **1738** record only snippets of audio that are 5 seconds or shorter. Additionally, in some embodiments, the actuators **1746** may be able to disable, enable, or modify communications functions, such as voice communications, email, text, or sms messaging, or other functions of the wireless device. Other illustrative functions of the wireless device are depicted in FIG. **11B**.

**[0156]** Wireless device subsystem **1710** may also include an override switch **1714** to generate a control signal to override control signals that are otherwise generated by switch **1740**.

**[0157]** A DMZ register may be used by the system automation control module **1712** to determine whether or not the wireless device is approaching or entering or leaving a dead zone location.

**[0158]** In operation, the system automation control module **1712** monitors the location of the wireless device. As a wireless device approaches a dead zone location, the system automation control module **1712** may generate control signals for modifying the IVA functions (e.g. image functions **1734**, video functions **1736**, audio functions **1738**, other functions **1739**) so that the IVA functions are activated and connected in a certain way. For example, the system automation control module **1712** may generate scripts, similar to those shown in FIG. **11B**, to change the performance of the IVA functions. For example, the script may cause video recorded by a device to become increasingly defocused, cause audio recorded and/or played by a device to decrease in volume, or cause certain types of IVA applications (e.g., entertainment applications) to have decreased access to IVA functions, etc. In some embodiments, the closer the wireless device is to the dead zone location, the more the control signals generated by the system automation control module **1712** may cause the performance of the actuators to change. In this way, the operator of the wireless device may become aware that he is approaching a location where one or more functionalities of his wireless device may be disabled, and may decide to avoid the dead zone location.

**[0159]** When the system automation control module **1712** detects that a wireless device is entering a dead zone, the system automation control module **1712** may disable or modify an IVA-related functionality of the wireless device. The disable control signal may be generated by override switch **1714** or by control signals that the system automation control module **1712** applies to the IVA system interface **1632**.

**[0160]** FIG. **17B** shows the illustrative dead zone control architecture **1701** for the wireless device of FIG. **17A**, incorporated into an external utility **1761**. The elements shown are generally as described in FIG. **11A** adapted for use with wireless device of FIG. **13A** according to the teachings of this disclosure. Similarly, FIG. **17D** shows an illustrative dead zone service which provides dead zone services related to IVA functions in a separate external utility. The dead zone service may be similar to the dead zone service discussed above as DZ service **1190**, with reference to FIG. **11A**. Alternatively, a single external utility may integrate the functions illustrated in FIGS. **17B** and **17D** or the functionalities may be distributed across a plurality of external utilities.

**[0161]** FIG. **17C** illustrates a memory map that may be stored in DZ register **1716** depicted in FIG. **17A**. The memory map may include indicia such as IVA application, application registration, registration date, permitted users, application type, location of use, dead zone areas, and functionalities to be disabled (or enabled or modified), and other. These functionalities may, for example, correspond to the actuators **1746** in FIG. **17A**.

**[0162]** The specific functionality to be disabled, enabled, or modified may be set by rules programed into the system automation control module **1712**. For instance, the rules may

cause system automation control module 1712 to disable video or audio recording, to limit audio playback volume, or to modify other IVA-related functions. Additionally, the rules may cause the system automation control module 1712 to disable, enable, or modify communication functionality and/or voice calling.

[0163] The modification of the behavior of the wireless device may in accordance to rules such as those depicted in FIG. 11C.

[0164] FIG. 18 shows an illustrative method of this disclosure. The method advances from start 1810 to detecting a trigger event 1820. For example, a location. If a trigger event is detected, the method detects a condition 1830. For example, a dead zone location. In step 1840, the method compares the detected condition to a predetermined set of conditions. For example, the detected location would be compared to a predetermined set of dead zone locations. At step 1850, the method determines whether the comparison yields a match. If comparison yields a match, a wireless function is disarmed 1860. If the comparison yields no match, the firearm is armed for firing.

[0165] An illustrative computer readable medium according to this disclosure contains program instructions for causing a computer to perform the method of detecting a trigger event; detecting a condition; comparing the condition to a predetermined condition; disabling a function of the wireless device if the condition matches the predetermined condition. The predetermined condition may be a shape (e.g., in the shape of a human), a location (e.g., in a dead zone), the identity of the operator, whether or not the wireless device has been tampered with (e.g., electronic control system or sensors have been tampered with), and so on.

[0166] While the invention has been described in connection with specific embodiments, it is evident that numerous alternatives, modifications, and variations will be apparent to those skilled in the art within the spirit and scope of the invention described above.

What is claimed is:

1. A system comprising:
  - a wireless device, the wireless device comprising a processor and a lower level system; and
  - a wireless device subsystem electrically adapted to the wireless device, the wireless device subsystem configured to provide a control signal to the lower level system in response to a detected condition, the control signal modifying an operational performance of the lower level system.
2. The system of claim 1 wherein the lower level system comprises an actuator and the control signal is applied the actuator.
3. The system of claim 1 wherein the lower level system comprises a switch and the control signal is applied to the switch, an output of the switch configuring an actuator.
4. The system of claim 1 wherein the lower level system comprises a system automation module and the control signal is applied to the system automation module.
5. The system of claim 4 wherein an output from the system automation module is applied to at least one task module, an output from the task module configuring an actuator.
6. The system of claim 5 wherein the at least one task module is selected from the group consisting of start/

resume, stop/end, path generation, path control, automatic path control system and other system.

7. The system of claim 6, wherein the wireless device is a mobile computing device, the actuator is configured to operate a wireless function of the mobile computing device, and the at least one of the plurality of task modules comprises a function operation task module, wherein in response to a detected condition of a dead zone, an output from the function operation task module configures the actuator to disable a function of the mobile computing device.

8. The system of claim 7 wherein the wireless function is selected from the group consisting of text messaging, email, audio communication, video streaming, and combinations thereof.

9. The system of claim 6, wherein the wireless device is a firearm, the actuator is configured to operate an enable/disable feature of the firearm, and the at least one of the plurality of task modules comprises an enable/disable feature operation task module, wherein in response to a detected condition of a dead zone, an output from the enable/disable feature operation task module configures the actuator to enable or disable the firearm.

10. The system of claim 6, wherein the wireless device is a drone, the actuator is configured to operate a camera, and the at least one of the plurality of task modules comprises a camera operation task module, wherein in response to a detected condition of a dead zone, an output from the camera operation task module configures the actuator to disable the camera.

11. The system of claim 6, wherein the wireless device is a drone, the actuator is configured to operate a flight control system of the drone, and the at least one of the plurality of task modules comprises a takeoff and landing task module, a trajectory generation & control task module, and an automatic flight control system task module, wherein in response to a detected condition of operation of the wireless device in a dead zone, an output from the at least one of the plurality of task modules configures the flight control system to steer the drone clear of the dead zone.

12. The system of claim 11 wherein the flight control system comprises flight control surfaces, connecting linkages, and operating mechanisms to control the drone's direction in flight.

13. The system of claim 6, wherein the wireless device is a mobile computing device, the actuator is configured to operate an augmented reality application, and the at least one of the plurality of task modules comprises an augmented reality service operation task module, wherein in response to a detected condition of a dead zone, an output from the augmented reality service task module configures the actuator to disable the augmented reality application.

14. The system of claim 4, wherein the wireless device is a mobile computing device, the actuator is configured to operate an augmented reality application, wherein the task module comprises an augmented reality input service, an augmented reality rendering service, and an augmented reality output service, and wherein in response to a detected condition of operation of the wireless device in a dead zone, an output from the at least one of the plurality of task modules configures the augmented reality rendering service to cease rendering augmented reality content while the wireless device is in the dead zone.

15. The system of claim 6, wherein the wireless device is a mobile computing device, the actuator is configured to

operate a camera, and the at least one of the plurality of task modules comprises an image task module, wherein in response to a detected condition of a dead zone, an output from the image task module configures the actuator to disable the camera.

**16.** The system of claim 6, wherein the wireless device is a mobile computing device, the actuator is configured to operate a video system and the at least one of the plurality of task modules comprises a video task module, wherein in response to a detected condition of operation of the mobile computing device in a dead zone, an output from the video task module configures the video system to disable video recording.

**17.** The system of claim 6, wherein the wireless device is a mobile computing device, the actuator is configured to operate an audio system and the at least one of the plurality of task modules comprises an audio task module, wherein in response to a detected condition of operation of the mobile computing device in a dead zone, an output from the audio task module configures the audio system to disable audio recording.

**18.** The system of claim 1, wherein the wireless device subsystem resides in the wireless device.

**19.** The system of claim 1, wherein the wireless device subsystem resides in an external utility.

**20.** The system of claim 1, wherein the wireless device subsystem provides the control signal to a system automation module residing in the lower level system.

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