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(54) **SHOOTING SIMULATOR WITH GPS AND AUGMENTED REALITY**

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F41J 5/14	(2006.01)
G01S 19/13	(2010.01)

(52) **U.S. Cl.**
CPC ***F41J 5/14*** (2013.01); ***G01S 19/13*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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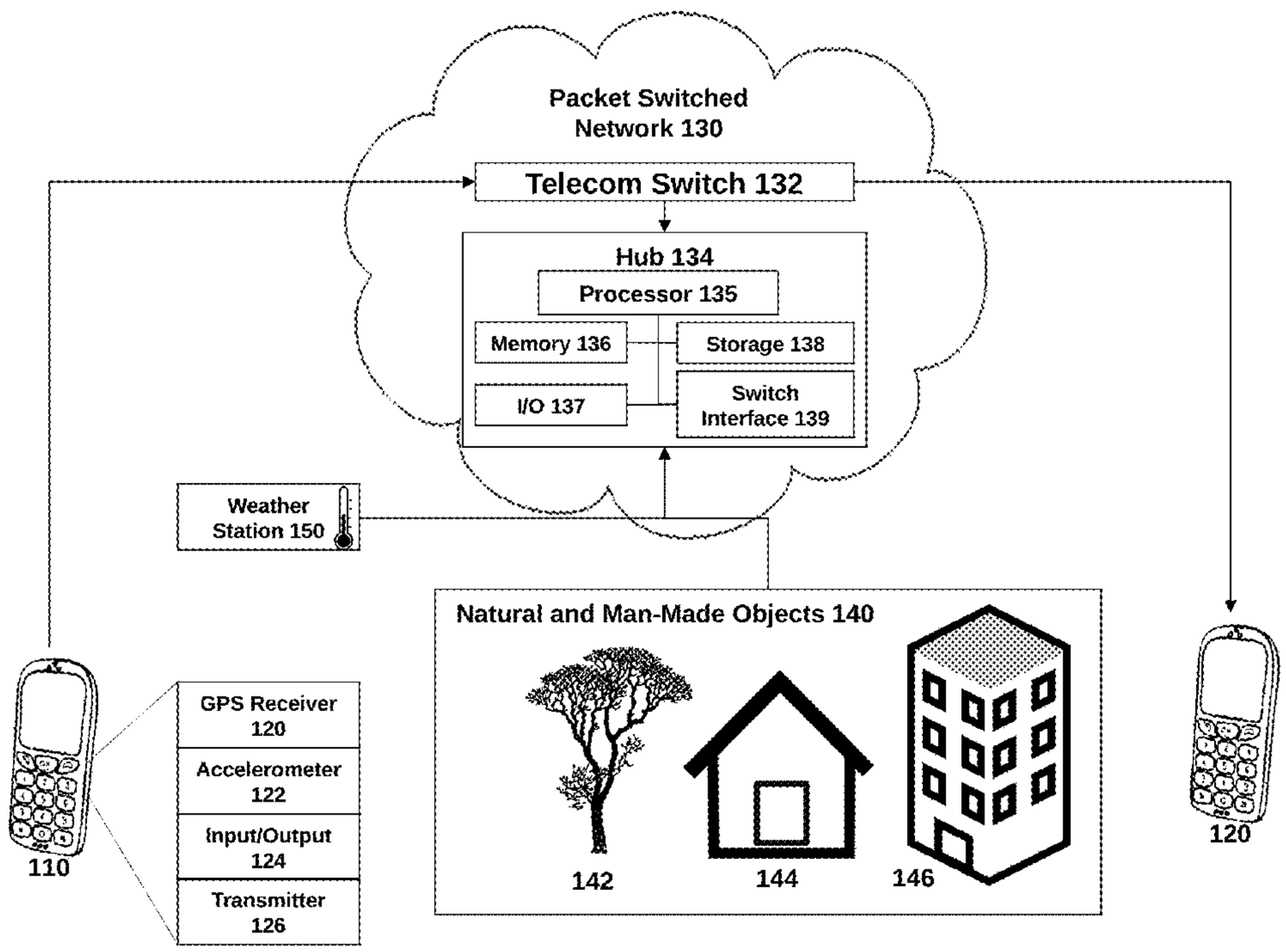
(57) **ABSTRACT**

A real-life target is hit with a virtual bullet or projectile using GPS-enabled or otherwise location aware devices which report their location. Real world information is taken into account, such as the terrain, elevation, weather, and line of sight, to determine if the virtual bullet hits the real-life target. Virtual information is also taken into account, such as which weapon is selected and what its distance and accuracy are. Further, information about the shooter is taken into account, such as his/her accuracy, how tired he/she is (based on recent travel distance and velocity), and how steady the GPS-enabled device is being held. Thus, a simulation which mirrors reality is made, allowing people to play a more realistic type of a virtual action with each other.

18 Claims, 4 Drawing Sheets



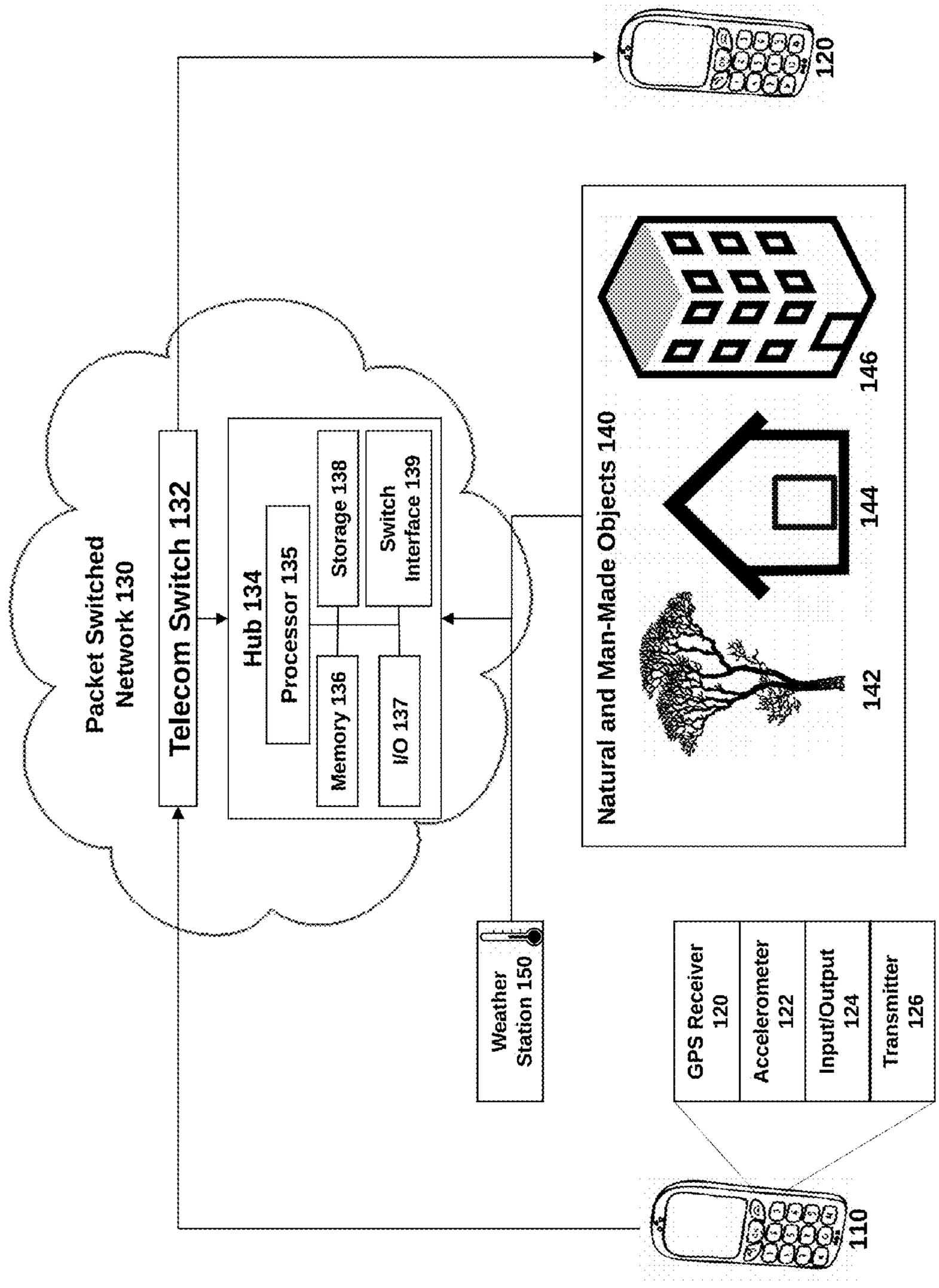

120
Packet Switched Network 130
Telecom Switch 132
Hub 134
Processor 135
Memory 136
I/O 137
Storage 138
Switch Interface 139
Natural and Man-Made Objects 140
142
144
146
Weather Station 150
GPS Receiver 120
Accelerometer 122
Input/Output 124
Transmitter 126
110

Figure 1

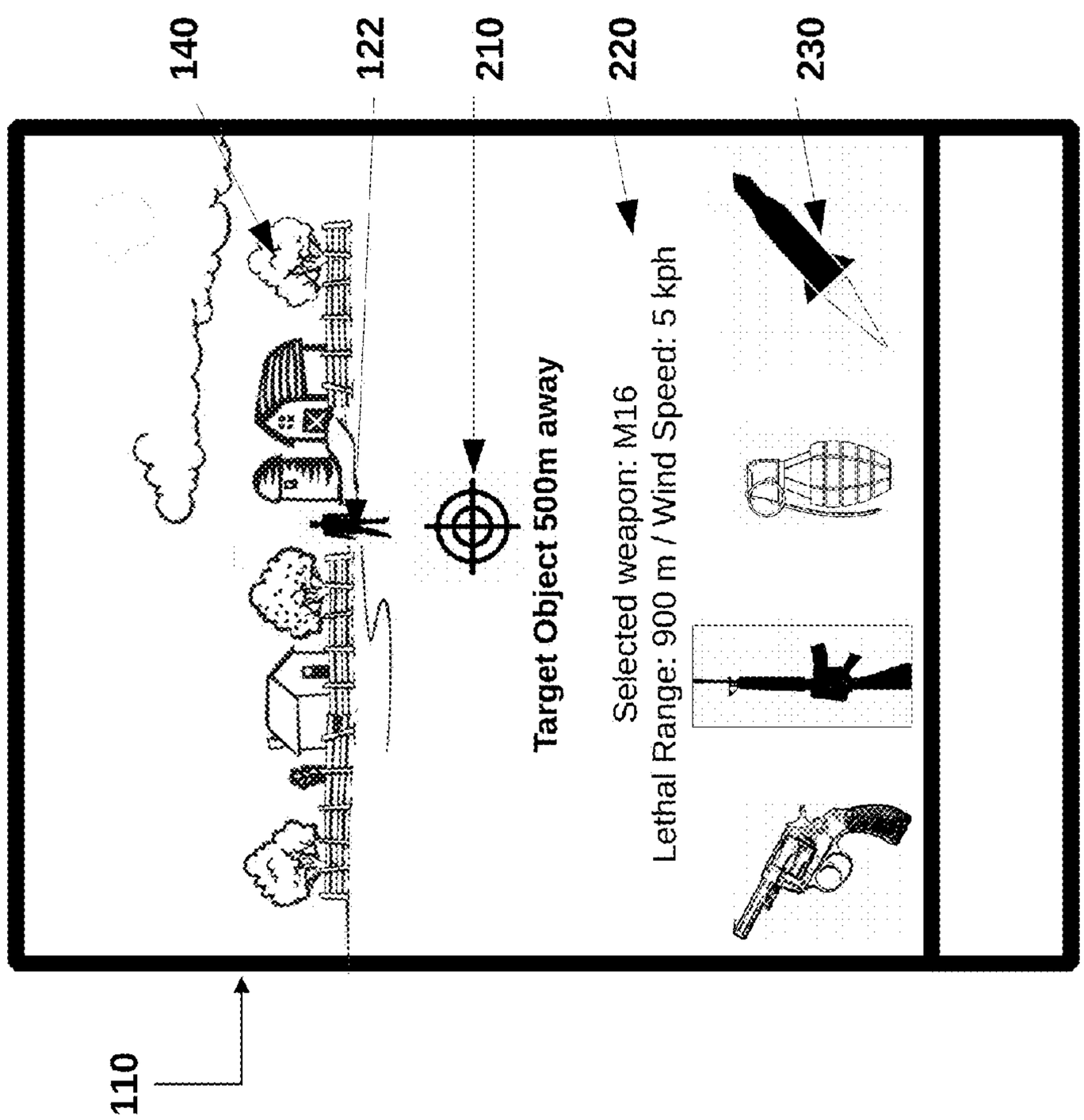

140
122
110
120
130
Target Object 500m away
Selected weapon: M16
Lethal Range: 900 m / Wind Speed: 5 kph
110

Figure 2

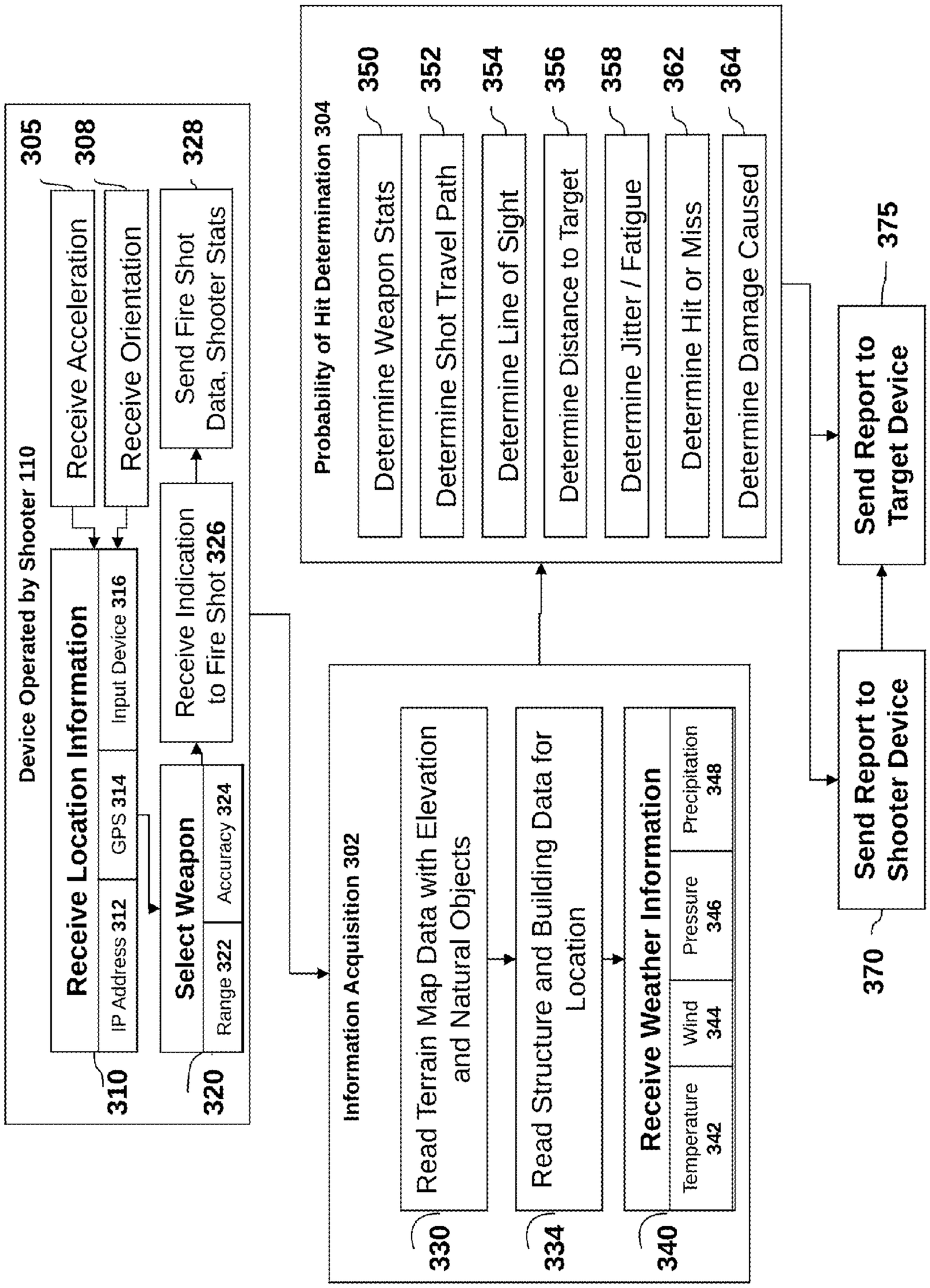

Device Operated by Shooter 110
Receive Location Information
IP Address 312
GPS 314
Input Device 316
310
Select Weapon
Range 322
Accuracy 324
320
Receive Acceleration
Receive Orientation
Receive Indication to Fire Shot 326
Send Fire Shot Data, Shooter Stats
305
308
328
Information Acquisition 302
Read Terrain Map Data with Elevation and Natural Objects
330
Read Structure and Building Data for Location
334
Receive Weather Information
Temperature 342
Wind 344
Pressure 346
Precipitation 348
340
Probability of Hit Determination 304
Determine Weapon Stats
Determine Shot Travel Path
Determine Line of Sight
Determine Distance to Target
Determine Jitter / Fatigue
Determine Hit or Miss
Determine Damage Caused
350
352
354
356
358
362
364
Send Report to Shooter Device
Send Report to Target Device
370
375

Figure 3

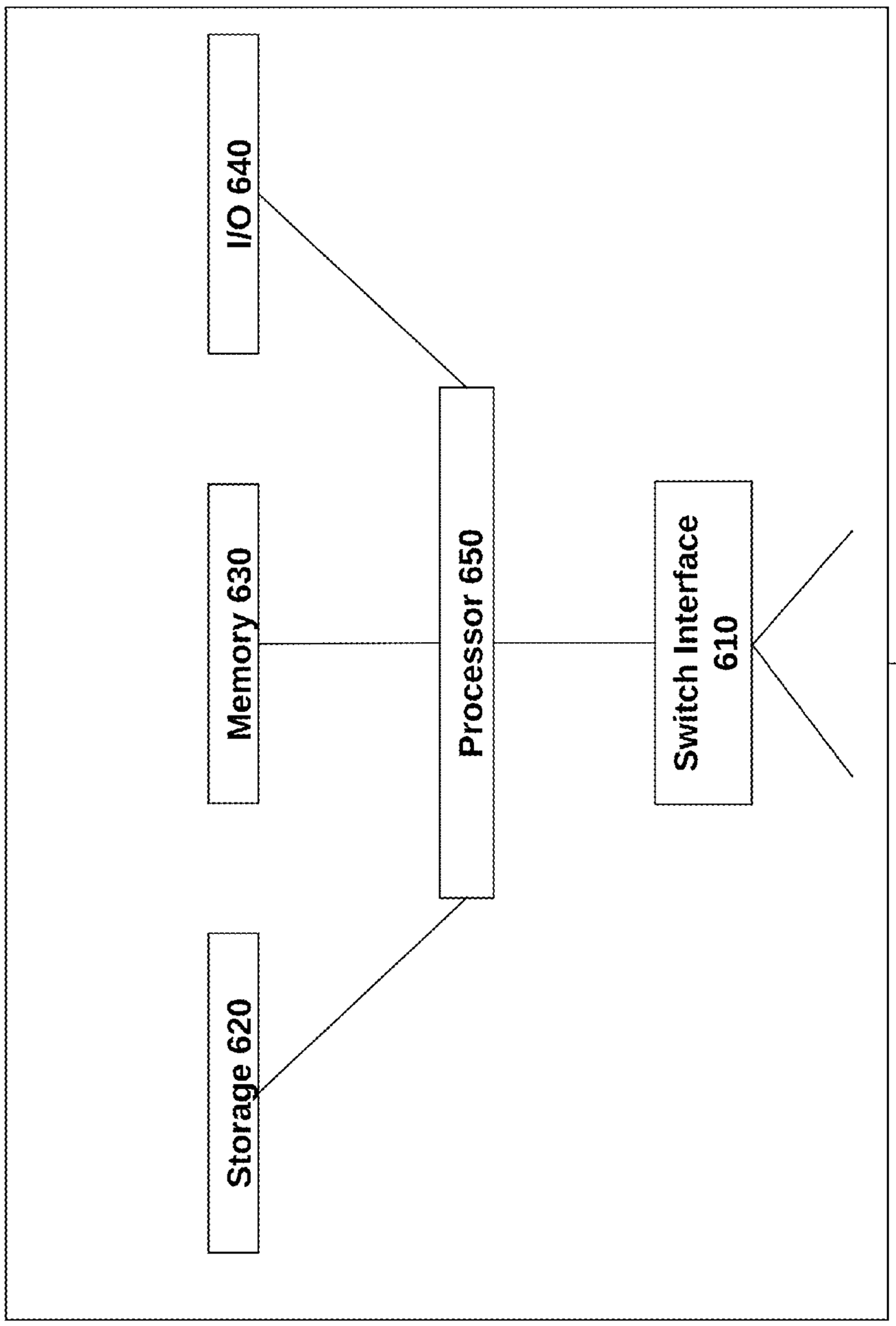

I/O 640
Memory 630
Processor 650
Switch Interface 610
Storage 620
600

Figure 4

SHOOTING SIMULATOR WITH GPS AND AUGMENTED REALITY

FIELD OF THE DISCLOSED TECHNOLOGY

The disclosed technology relates generally to global positioning systems and augmented reality and, more specifically, to using same to fire accurate virtual shots at targets.

BACKGROUND OF THE DISCLOSED TECHNOLOGY

Back in the 1980s, children played laser tag types of games by wearing an infrared receiver and holding an infrared gun. One person would shoot at another, and if your gun's infrared signal hit your opponent's infrared receiver, you scored a hit.

More recently, this type of shooting and being hit has been updated, using augmented reality. One can shoot digital versions of others displayed on a screen, which partially includes real video. For example, U.S. Pat. No. 9,132,342, assigned to Sulon Technologies Inc., discloses a screen and sensors on a person who carries a toy gun. Players then try and shoot each other, using this GPS-enabled system. Others, such as WO 2016/02060, assigned to SmartLab PTE Ltd., disclose a more direction combination of laser tag and GPS positioning. Infrared beams are used to transmit and receive shots, and hits are displayed.

Still, further improvements are needed to make the games more realistic and take them from the level of a game to a more sophisticated simulation that can be used for real-world training, minus the actual guns and weapons.

SUMMARY OF THE DISCLOSED TECHNOLOGY

A real-life target is hit with a virtual bullet or projectile, using GPS-enabled or other location aware devices which report their location. Real world information is taken into account, such as the terrain, elevation, weather, and line of sight, to determine if the virtual bullet hits the real-life target. Virtual information is also taken into account, such as which weapon is selected and what its distance and accuracy are. Further, information about the shooter is taken into account, such as his/her accuracy, how tired he/she is (based on recent travel distance and velocity), and how steady the GPS-enabled device is being held. Thus, a simulation which mirrors reality is made, allowing people to play a more realistic type of a virtual action with each other.

The above can be carried out as follows. A first packet-switched network receives location information determined by a GPS receiver on a device operated by a shooter. A second packet-switched network receives location information determined by a GPS receiver on a device operated by a target. Map data comprising both real and man-made terrain elements are further determined or read. "Real terrain" refers to natural terrain, such as mountains, valleys, elevation changes, and trees. "Man-made terrain" refers to buildings, posts, and other constructed objects which rise above the surface of the earth. Data is received from the device operated by the shooter, indicating that a shot has been fired.

Then a probability of the shooter hitting the target with the shot is determined. This determination is, in some embodiments, based on whether the target is in a line of sight to the shooter and a distance between the shooter and the target, the distance calculated from the location information received from the device operated by the shooter and the device operated by the target. A notification to the device operated by the shooter and/or the device operated by the target of a closest distance that the shot came to the location of the device operated by the target can be sent. In other words, the shooter or target can be notified as to how close they came to hitting, or being hit by, the virtual bullet.

A "shot" or "virtual bullet" is a weapon which causes damage to an avatar or character played in the simulation, upon hitting such an avatar or character. The shot or virtual bullet trajectory, distance traveled, and damaging power are determined, based, in part, on real-world information at the time of the shot. More specifically, items which determine where the shot goes and how much damage it can do can include an angle of the device operated by the shooter at the time the shot is made. Such an angle can be outputted by an accelerometer in the device of the shooter. Orientation of the device operated by the shooter (determined based on output by the accelerometer, compass or GPS receiver in the device) can also be used to determine trajectory, probability of hit, and other attributes of the bullet. A range and accuracy of a weapon selected for said shot can also be taken into account, the weapon being a virtual representation of a real weapon, such as having the same name as a real weapon. Real-time precipitation and/or wind conditions and/or barometric pressure reported near a location of one of the devices operated by the shooter, and the device operated by the target, can also be taken into account. For purposes of this disclosure, "near" is defined as "a one of a closest or closest reporting weather station or device outputting the information used to adjust probability of a shot" or "within 10 kilometers" or "a regional location selected by an operator of the simulation."

Jitter (how much the device is shaking at a time of shot or a time period before the shot is made) of the device operated by the shooter can also be used to account for accuracy of a shot and, therefore, probability of a hit on a target. A pre-determined shooting accuracy of the shooter, such as by way of determining accuracy in a shooting range (real or virtual, using, for example, the device of the shooter) can be taken into account to modify the probability that the shooter will hit the target. A difference in elevation between the shooter and target can also be taken into account, such as giving a higher probability of hit when shooting at a negative angle rather than at a positive angle, relative to the ground.

A system for determining whether a target has been hit, in embodiments of the disclosed technology, receives an indication of location of a device operated by a shooter and a device operated by a target, as reported by a GPS receiver on each respective device. Weather information near said location of the device operated by the shooter is further received, having at least two of present precipitation conditions, temperature, and barometric pressure. Map data with elevation of solid objects between the device operated by the shooter and the device operated by the target can also be taken into account. Angle data of the device operated by the shooter at a time when the device indicates that a shot has been fired is used, in embodiments, to determine the trajectory of a virtual object. Then, based on treating the virtual bullet as a real object shot from the device of the shooter (using one, some, or all of the location of the devices, the weather information, the map data, and the angle data) a probability of the virtual object hitting the target is determined and/or calculated. In some embodiments, hit or miss data are displayed on the device operated by the shooter, letting him know if the target has been hit.

In some cases, a determination is made that the device operated by the target does not have a line of sight to the target (direct or with a trajectory of the bullet, such as with an upward angle or "lob" thereof). Thus, a determination that the virtual object has a zero probability of hitting the target might be made in such an instance. A closest distance that a shot (including damage from a shot which would indicate a partial or full hit) came to a target can be displayed on a device operated by the target or the shooter.

Referring now to the virtual weapon chosen, it can have an accuracy and distance corresponding to a real world weapon (actual weapon) based on it having the same name as the real weapon or likeness exhibited on the screen when it is selected (e.g., an "AK-47" can have a virtual representation and real-world statistics in terms of accuracy, distance, and explosive power/size). A weapon can have a small point of damage or do damage over a large area (such as a grenade having a larger damage range, with decreasing amounts of damage, from the impact point than a bullet).

Probability of a hit can further be determined based on movement of the device operated by the shooter, as determined by one of the GPS receiver or accelerometer on the device of the shooter in a time period before the shot. Such movement might indicate fatigue of the shooter, which corresponds to a less accurate shot. Shakiness or jitter of the device while the shot is being made might also decrease accuracy (or cause a different target to be hit).

In a method of carrying out embodiments of the disclosed technology, such as described above, a location of a first hand-held device, using a GPS receiver, is determined, based on the GPS output. (GPS is "global positioning system" or any device which outputs location information.) One points the hand-held device towards a target hand-held device, causing the first hand-held device to have an accelerometer at a specific orientation. A weapon is selected (this step can take place before the prior step), the weapon having an accuracy and maximum distance associated there-with. An indication to fire a shot from the weapon is received from/sent to the first hand-held device, whereby said first hand-held device sends data indicating the selected weapon, the orientation, and a time of the shot.

A target hand-held device can be found, such as by placing an indicium or indicia represented thereof (based on proper aiming/pointing the device there-toward, on a screen of the device of the shooter, before the step of pointing can be carried out. A step of receiving back an indication via the network node that the target has been hit, can be carried out. If not hit, then a closest distance to the target (or other targets) that the shot reached can be displayed. An indication that the shot was blocked by a natural or man-made solid object between the first hand-held device and the target hand-held device can alternatively be displayed.

Any device or step to a method described in this disclosure can comprise, or consist of, that which it is a part of, or the parts which make up the device or step. The term "and/or" is inclusive of the items which it joins linguistically, and each item by itself.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a high level block diagram of devices which are used to carry out embodiments of the disclosed technology.

FIG. **2** shows a sample of output on a device operated by a shooter, in an embodiment of the disclosed technology.

FIG. **3** shows a high-level flow chart of steps carried out during embodiments of the disclosed technology.

FIG. **4** shows a high-level block diagram of a device that may be used to carry out the disclosed technology.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE DISCLOSED TECHNOLOGY

A real-life target is hit with a virtual bullet or projectile, using GPS-enabled or otherwise location-aware devices which report their location. Real world information is taken into account, such as the terrain, elevation, weather, and line of sight, to determine if the virtual bullet hits the real-life target. Virtual information is also taken into account, such as which weapon is selected and what its distance and accuracy are. Further, information about the shooter is taken into account, such as his/her accuracy, how tired he/she is (based on recent travel distance and velocity), and how steady the GPS-enabled device is being held. Thus, a simulation which mirrors reality is made, allowing people to play a more realistic type of a virtual action with each other.

Embodiments of the disclosed technology are described below, with reference to the figures provided.

FIG. **1** shows a high level block diagram of devices which are used to carry out embodiments of the disclosed technology. Bi-directional transceivers **110** and **120** are shown. These are devices which generally have displays and receive and send data wirelessly. Hardware processors therein carry out instructions, and any number of additional devices is attached, including likenesses of weapons and input devices. Device **110** will be described as a device operated by a "shooter" (a person firing a virtual shot), and device **120** will be described as a device operated by a "target" (a person being virtually shot). Each has some or all of the following elements: a GPS receiver **120**, an accelerometer **122**, input/output mechanisms **124**, and a transmitter **126**.

The GPS (global positioning system) receiver **120** is a global positioning system receiver which receives data from global navigation satellites to determine location, and reports this location information. The accelerometer **122** measures acceleration and, indirectly, distance, based on time at a rate of acceleration. Other location determination devices which can be used include the Internet protocol (IP address) of one the bi-directional transceivers **110** and/or **120**, and looking up a location associated with the Internet protocol address. Further, location can be determined based on which cellular tower is used.

The input/output **124** refers to a keyboard, touch screen, display, and the like, used to receive input and send output to a user of the device. A transmitter **126** enables wireless transmission and receipt of data via a packet-switched network, such as packet-switched network **130**. This network, in embodiments, interfaces with a telecommunications switch **132** which routes phone calls and data between two of the bi-directional transceivers **110** and **120**. Versions of these data, which include portions thereof, can be transmitted between the devices. A "version" of data is that which has some of the identifying or salient information, as understood by a device receiving the information. For example, a GPS receiver **120** may report location data in one format, and a version of these data can be reported via the packet-switched network **130** to a server. Both versions comprise location-identifying data, even if the actual data are different in each case.

Referring to the telecom switch **132**, a device and node where data are received and transmitted to another device via electronic or wireless transmission, is connected to a hub **134**, such as operated by an entity controlling the methods of use of the technology disclosed herein. This hub has a

processor **135** deciding how the bi-directional transceivers **110** and **120** interact with each other, are notified about the presence of one another, or "shoot" one another. This hub **134** further has memory **136** (volatile or non-volatile) for temporary storage of data, storage **138** for permanent storage of data, and input/output **137** (like the input/output **124**), and an interface **139** for connecting via electrical connection to other devices.

Still discussing FIG. **1**, natural and man-made objects **140** are shown by way of example. Here, a tree **142**, house **144**, and commercial building **146** are shown. Each of these can be in a path between the shooter **110** and target **120**, blocking a shot which would otherwise hit the target **120** from reaching its destination. Thus, it is not enough to simply shoot at the target. Rather, the position of these objects is known by way of incorporating/receiving such data (herein, "map data"), as well as elevation data (elevation of the shooter **110**, target **120**, and objects **140**), in order to determine if the shooter and target can hit each other. In the prior art, this might be accomplished by way of sending an infrared beam, but in the present technology, this is carried out by way of determining a position of all the aforementioned objects.

Bi-directional transceivers **110** and **120** are operated by those who are taking part in a simulation. Each reports its position, orientation, present velocity, elevation, or some parts thereof, based on the use of specialized sensors, such as a GPS receiver **120**, accelerometer **122**, input **124**, and transmitter **126**. Based on a determination of map data describing where objects **140** are, it is determined if the shooter **110** can hit the target **120**, or is blocked by an object such as a building. Based on information about the weather received in real-time in some embodiments, the path of bullet or accuracy of the shot is adjusted. For example, a bullet travels differently in a higher pressure environment than a lower pressure environment. Temperature and wind also effect how a bullet travels.

FIG. **2** shows a sample of output on a device operated by a shooter, in an embodiment of the disclosed technology. Objects **140** are all around a target **122**. In this case, for the sake of simplicity, the target is shown standing in front of the objects in an open field. On the display, a shooter can select a weapon **230**, and information about this weapon is displayed. Here, an M16 with a lethal range of 900 meters is selected and, in this embodiment, the distance of the target **122** is shown (500 m). At present, there is a clear line of sight, but if the person/target **122** ducks behind the silo or tree, the line of sight can be lost, and this will be known, based on importing topographic map data; as such, the target **122** could not be hit by the shooter **110**. Further, weather information is taken into account as such in the text **220**, which includes wind speed in some embodiments. Thus, the shooter might adjust for the wind, as one would ordinarily when there is wind and shooting at a distance. Cross-hairs **210** might be displayed on a display device (such as a scope or bi-directional transceiver) to help the shooter take aim. With this picture in mind, FIG. **3** will now be described, explaining the details of the method which takes place from the shooter's perspective as well as from an operator's perspective.

FIG. **3** shows a high-level flow chart of steps carried out during embodiments of the disclosed technology. At the device operated by the shooter **110**, various kinds of information are acquired. Acceleration **305** information is acquired, such as from an accelerometer or GPS receiver (which can be used in step **356**, determining distance to target, determining jitter/fatigue (step **358**), and so forth). Orientation **308** information is further acquired, such as from the accelerometer, GPS, or a compass (which can be used to determine the travel path in step **352**, line of sight in step **354**, and so forth). Location information **310** is received, such as by way of a person's IP address **312** (e.g., an IP address associated with Parsippany, N.J., limits processing to targets in Morris County, New Jersey), GPS **314**, or other input devices **316**, such as laser site guides or the like. Once the location is determined along with the orientation, or before same, the shooter **110** selects a weapon in step **320**. Such a weapon has a pre-determined range **322** and accuracy **324**. This can also include splash damage and damage distance, and decrease in value from a point of impact.

The shooter then indicates that he/she wants to shoot in step **326**, such as by selecting a button, a display on the device he/she is operating, or a trigger on a gun or other device which is electrically coupled to a transmitting device. These fire shot data and the shooter stats are transmitted via a packet-switched network in step **328**. It should be understood that these steps (**326** and **328**) can take place after, before, or concurrent with, steps **305-324**, or some before and some after. The shooter's stats may be inputted from his/her data acquired from real shooting competitions, or shooting events, or that of others who have shot the selected weapon of step **320**. In this manner, one can pretend to shoot as, say, a professional sniper or a brother who wins shooting competitions in Arizona. Or, the shooter stats might be based on previous attempts to shoot virtual bullets and virtual weapons in other such simulations.

External information about the relative location is determined or acquired in the information acquisition block **302**. This can take place before, concurrent with, or after steps **305-328**. Terrain map data with elevation and natural objects in red in step **330**, while structural and building data are read in step **334** to determine what is between the shooter and target or targets, as well as how these items might affect the shot. On high wind days, for example, a wind tunnel is often created between skyscrapers, causing much stronger wind and more difficult—or even nearly impossible—shots to be made. Elevation, where the shooter is above the target, might make accuracy greater, whereas the opposite might make it lower. Further, weather information is received in step **340**, such as from a weather station. This can include temperature **342**, wind **344**, pressure **346**, and precipitation **348**, all of which can affect the path of a bullet and accuracy of the shooter. For example, the shooter or weapon may not function well below a certain temperature. This can be taken into account when determining the path of the bullet, where it hits, and if it escapes the weapon at all.

Finally, all of the prior data are used in box **304**, comprising a series of steps to determine if the bullet hits a target. Based on the selected weapon in step **320**, its stats are determined in step **350**, such as how likely it is to jam, how far it can shoot, how far it typically shoots, how large an impact it makes, how much damage it does from the impact point, and the like. A shot travel path in step **352** can be determined. This can be based on the orientation of the shooter, as well as the angle of the shot (based on output of an accelerometer). Once the path of bullet travel is known, it can be determined if this bullet will hit a target or if it is being blocked by an object, in step **354**. Line of sight determination has been described more fully with reference to FIGS. **1** and **2** above. A distance to a target is also determined, in some embodiments, in step **356**. Some or all of these factors help determine if the bullet will reach a target.

Accuracy of the shot can also depend on the state of the shooter. Someone who is more rested typically can shoot more accurately. Someone who is running from zombies, in a simulation, and has, in reality, just run about a kilometer and is trying to turn around and fire while running, is not going to be as accurate with his/her shot. Therefore, in embodiments, based on prior travel data received from a GPS **314**, prior and current acceleration data received in step **305**, and changes in orientation received in step **308**, it can be determined how tired the shooter likely is at the present moment, and how much the device is shaking, moving, or making abrupt turns. All such actions in real life can affect a shot. For example, while at the moment of the shot the device might be facing at a particular orientation, if a gun were rotating transverse to the shot while shooting, the bullet path would be affected accordingly. Thus, to compensate for the digital last moment output and make it more like a "more messy" real world gun movement, the shot path is determined not only on the precise moment of the shot, but also on movement just prior to the shot.

Using the above data, in step **362** it is finally determined if the shot hit or missed a target and the amount of damage caused (step **364**), even if the shot "missed" but hit close. Reports or information can then be sent to the shooter's device (step **370**) and/or the target device (step **375**) stating, for example, how close the shot was to hitting the target, or simply that it did hit, miss, or did a certain amount of damage, or even killed the target.

FIG. **4** shows a high-level block diagram of a device that may be used to carry out the disclosed technology. Device **600** comprises a processor **650** that controls the overall operation of the computer by executing the device's program instructions which define such operation. The device's program instructions may be stored in a storage device **620** (e.g., magnetic disk, database) and loaded into memory **630**, when execution of the console's program instructions is desired. Thus, the device's operation will be defined by the device's program instructions stored in memory **630** and/or storage **620**, and the console will be controlled by processor **650** executing the console's program instructions. A device **600** also includes one, or a plurality of, input network interfaces for communicating with other devices via a network (e.g., the internet). The device **600** further includes an electrical input interface. A device **600** also includes one or more output network interfaces **610** for communicating with other devices. Device **600** also includes input/output **640**, representing devices which allow for user interaction with a computer (e.g., display, keyboard, mouse, speakers, buttons, etc.). One skilled in the art will recognize that an implementation of an actual device will contain other components as well, and that FIG. **4** is a high level representation of some of the components of such a device, for illustrative purposes. It should also be understood by one skilled in the art that the method and devices depicted in FIGS. **1** through **3** may be implemented on a device such as is shown in FIG. **4**.

Further, it should be understood that all subject matter disclosed herein is directed, and should be read, only on statutory, non-abstract subject matter. All terminology should be read to include only the portions of the definitions which may be claimed. By way of example, "computer readable storage medium" is understood to be defined as only non-transitory storage media.

While the disclosed technology has been taught with specific reference to the above embodiments, a person having ordinary skill in the art will recognize that changes can be made in form and detail without departing from the spirit and the scope of the disclosed technology. The described embodiments are to be considered in all respects only as illustrative and not restrictive. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope. Combinations of any of the methods, systems, and devices described hereinabove are also contemplated and within the scope of the disclosed technology.

I claim:

1. A system for determining if a target has been hit, comprising:

receiving, via a first packet-switched network, location information determined by a GPS receiver on a device operated by a shooter;

receiving, via a second packet-switched network, location information determined by a GPS receiver on a device operated by a target;

reading map data comprising both real and man-made terrain elements;

receiving data from said device operated by said shooter indicating a shot;

determining a probability of said shooter hitting said target with said shot based on, at least:

if said target is in a line of sight to said shooter;

a distance between said shooter and said target, said distance calculated from said location information received from said device operated by said shooter, and said device operated by said target; and

pre-determined shooting accuracy of said shooter, based on shots fired in a shooting range.

2. The system of claim **1**, further comprising sending a notification to said device operated by said shooter, and said device operated by said target, of a closest distance that said shot came to said location of said device operated by said target.

3. The system of claim **1**, wherein said probability is further determined by an angle of said device operated by said shooter, said angle outputted by an accelerometer in said device of said shooter.

4. The system of claim **3**, wherein said probability is further determined by an orientation of said device operated by said shooter, said orientation determined based on output by said accelerometer and a compass or said GPS receiver in said device of said shooter.

5. The system of claim **1**, wherein said probability is further determined, based on both a range and accuracy of a weapon selected for said shot.

6. The system of claim **5**, wherein said probability is further determined, based on real-time precipitation and/or wind conditions and/or barometric pressure reported near a location of one of said devices operated by said shooter, and said device operated by said target.

7. The system of claim **5**, wherein said probability is further determined based on jitter of said device operated by said shooter at a time of said shot.

8. The system of claim **5**, wherein said probability is further based on a difference in elevation between said shooter and said target.

9. A system for determining whether a target has been hit, comprising:

receiving an indication of location of a device operated by a shooter, as reported by a GPS receiver on said device operated by said shooter;

receiving an indication of location of a device operated by a target, as reported by a GPS receiver on said device operated by said target;

receiving weather information near said location of said device operated by said shooter, comprising at least two of present precipitation conditions, temperature, and barometric pressure;

receiving map data with elevation of solid objects between said device operated by said shooter and said device operated by said target;

receiving angle data of said device operated by said shooter at a time that said device operated by said shooter indicates that a shot has been fired, and determining trajectory of a virtual object shot from said device operated by said shooter;

determining, based on said location of said device operated by said shooter, location of said device operated by said target, said weather information, said map data, and said angle data a probability of said virtual object hitting said target if said virtual object were a real object;

causing the exhibition of hit or miss data on a display on said device operated by said shooter.

10. The system of claim **9**, wherein, upon a determination being made that said device operated by said target does not have a line of sight to said target, determining that said virtual object has a zero probability of hitting said target.

11. The system of claim **9**, wherein said probability is based on the accuracy of a virtual weapon used to fire said virtual shot, said virtual weapon having accuracy and distance measurements corresponding to an actual weapon.

12. The system of claim **11**, comprising sending a notification to said device operated by said shooter and said device operated by said target, of a closest distance that said shot came to said location of said device operated by said target.

13. The system of claim **9**, wherein said probability is further determined based on movement of said device operated by said shooter, as determined by one of said GPS receiver or accelerometer on said device of said shooter, in a time period before said shot, which indicates fatigue of said shooter.

14. The system of claim **9**, wherein said probability is further determined, based on movement of said device operated by said shooter, as determined by one of said accelerometer on said device of said shooter, in a time period before said shot, which indicates shakiness while said shot was being made.

15. A method for determining if a target has been hit, comprising:

determining location of a first hand-held device using a GPS receiver;

pointing said hand-held device towards a target hand-held device causing said first hand-held device to have an accelerometer at a specific orientation;

selecting a weapon, said weapon having an accuracy and maximum distance associated there-with;

sending in an indication to fire a shot from said weapon to said first hand-held device, whereby said first hand-held device sends data indicating said selected weapon, said orientation, and a time of said shot;

wherein said indication further indicates that said shot was blocked by a natural or man-made solid object between said first hand-held device and said target hand-held device.

16. The method of claim **15**, further comprising a step of finding a target hand-held device before said step of pointing.

17. The method of claim **16**, further comprising a step of receiving back an indication via said network node that said target has been hit.

18. The method of claim **16**, further comprising a step of receiving back an indication of closest distance that said shot reached said target.

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