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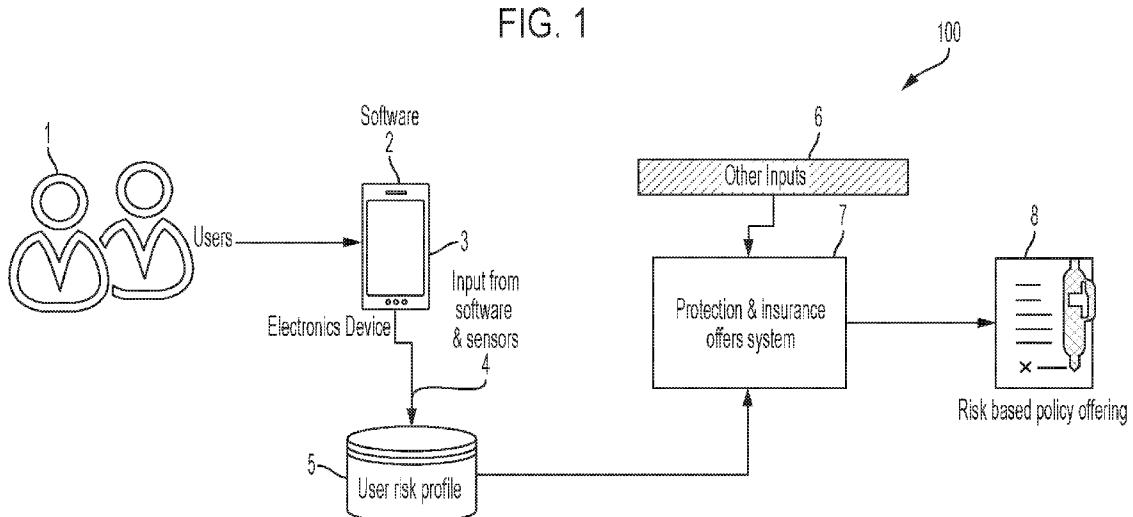
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FIG. 1



(57) Abstract: Systems and methods are disclosed herein that can detect use of a consumer electronics device and that can generate and offer insurance or protection plans that measure, account, and adjust for the use of the consumer electronics device and consumer tendencies while using the consumer electronics device.

## SYSTEMS AND METHODS FOR GENERATING CONTEXTUALLY RELEVANT DEVICE PROTECTIONS

### FIELD

[0001] The present invention relates generally to a consumer electronics device. More particularly, the present invention relates to systems and methods that detect use of the consumer electronics device.

### BACKGROUND

[0002] Many consumer electronics devices are sold at price points that are considered expensive to an average consumer. As a result, the average consumer sometimes chooses to purchase a protection or other insurance plan to protect the consumer electronics device and reimburse the consumer for replacing or repairing the consumer electronics device when lost or damaged.

[0003] While many consumers commonly purchase insurance or protection plans, known insurance or protection plans are conventionally based on a retail price of the consumer electronics device, a cost to replace the consumer electronics device, or a cost to repair the consumer electronics device. However, known insurance or protection plans fail to account for use of the consumer electronics device or consumer tendencies while using the consumer electronics device.

[0004] In view of the above, there exists a need for systems and methods for generating and offering insurance or protection plans that measure, account, and adjust for use of the consumer electronics device and consumer tendencies while using the consumer electronics device.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is a block diagram of a system in accordance with disclosed embodiments;

[0006] FIG. 2 is a flow diagram of a method for detecting whether an electronics device has been dropped in accordance with disclosed embodiments;

[0007] FIG. 3 is a graph plotting accelerometer measurements in accordance with disclosed embodiments;

[0008] FIG. 4 is a graph plotting a tendency to drop a device in accordance with disclosed embodiments;

[0009] FIG. 5 is a flow diagram of a method for adjusting risk in accordance with disclosed embodiments;

[0010] FIG. 6 is a flow diagram of a method for adjusting risk and generating warnings in accordance with disclosed embodiments;

[0011] FIG. 7 is a graph plotting device depreciation in accordance with disclosed embodiments;

[0012] FIG. 8 is a flow diagram of a method for accounting for device depreciation in accordance with disclosed embodiments;

[0013] FIG. 9 is a flow diagram of a method for accounting for device durability in accordance with disclosed embodiments; and

[0014] FIG. 10 is a flow diagram of a method for generating a protection plan based on device diagnostics in accordance with disclosed embodiments.

## DETAILED DESCRIPTION

[0015] While this invention is susceptible of an embodiment in many different forms, there are shown in the drawings and will be described herein in detail specific embodiments thereof with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention. It is not intended to limit the invention to the specific illustrated embodiments.

[0016] Embodiments disclosed herein include systems and methods that can detect use of a consumer electronics device and systems and methods that can generate and offer insurance or protection plans that measure, account, and adjust for the use of the consumer electronics device and consumer tendencies while using the consumer electronics device.

[0017] In some embodiments, systems and methods disclosed herein can receive or retrieve data from sensors included within the consumer electronics device, analyze the data, and determine whether the data indicates that the consumer electronics device has been dropped. For example, in some embodiments, systems and methods disclosed herein can determine whether the data from an accelerometer included within the consumer electronics device indicates that acceleration of the consumer electronics device is consistent with the consumer electronics device being dropped, such as the data both exceeding a first threshold value and dropping below a second threshold value within a predetermined period of time or the data initially dropping below the second threshold value, subsequently exceeding the first threshold value, and subsequently dropping below the second threshold value within the predetermined period of time. Additionally or alternatively, in some embodiments, systems and methods disclosed herein can determine whether the data from a gyroscope included within the consumer electronics

device indicates that a rotation and an orientation of the consumer electronics device is consistent with the consumer electronics device being dropped and strongly impacting a surface.

[0018] In some embodiments, systems and methods disclosed herein can identify activities related to the consumer electronics device that pose potential risk of damage to the consumer electronics device. For example, in some embodiments, systems and methods disclosed herein can identify the activities that pose the potential risk of damage to the consumer electronics device based on location data of the consumer electronics device, intended location data of the consumer electronics device, or intended events to be attended by a user of the consumer electronics device.

[0019] In some embodiments, systems and methods disclosed herein can monitor user interactions with the consumer electronics device, including the user interactions or a lack of the user interactions with applications executed by the consumer electronics device, to determine a potential risk to the consumer electronics device or other items protected by an insurance or protection plan. In some embodiments, systems and methods disclosed herein can transmit an audible or visual warning message to the user indicative of the user interactions identified as posing the potential risk.

[0020] In some embodiments, systems and methods disclosed herein can identify a replacement cost percentage for the consumer electronics device based on a depreciated value of the consumer electronics device and generate and offer a discounted insurance or protection plan when the replacement cost percentage exceeds a predetermined threshold value.

[0021] In some embodiments, systems and methods disclosed herein can identify a durability index rating for the consumer electronics device and generate and offer a discounted insurance or protection plan when the durability index rating exceeds a predetermined threshold

value. In some embodiments, systems and methods disclosed herein can identify the durability index rating based on extensive testing of various makes and models of consumer electronics devices.

[0022] In some embodiments, systems and methods disclosed herein can execute a diagnostics test on the consumer electronics device, determine whether any components of the consumer electronics device are non-functional or broken, and generate and offer a discounted insurance or protection plan when a predetermined number of the components are identified as non-functional. In some embodiments, a value of the discounted insurance or protection plan can be based on which of the components is identified as non-functional and, based on past policy claims data, how often that non-functioning component is broken.

[0023] FIG. 1 is a block diagram of a system 100 in accordance with disclosed embodiments and can implement the methods disclosed herein. As seen, the system 100 can include a consumer electronics device 3 that can be operated by a user 1 and that can execute a software application 2. In some embodiments, the software application 2 can communicate with and receive or retrieve data from one or more sensors 4 included within the consumer electronics device 3. In some embodiments, the consumer electronics device 3 can include a smartphone, a tablet, or a laptop computer. When the consumer electronics device 3 is a smartphone, the consumer electronics device can include up to eight of the sensors 4, including one or more of a touchscreen, an accelerometer, a gyroscope, a magnetometer, a global positioning (GPS) system, a barometer, an ambient light sensor, a proximity sensor, and a fingerprint sensor. Additionally or alternatively, in some embodiments, the sensors 4 can include one or more cameras, which can collect the data when the software 2 includes video analytics software.

[0024] In some embodiments, the software application 2 can be stored and executed on the consumer electronics device 3. Alternatively, in some embodiments, the software application 2 can be web-based and can retrieve the data from the sensors 4 when the consumer electronics device 3 navigates to a website universal resource locator (URL) associated with the software application 2 or at periodic intervals identified by the software application 2.

[0025] In some embodiments, the software application 2 can generate a user risk profile 5 based on the data received from the sensors 4 and save the user risk profile 5 in a database device. For example, in some embodiments, the software application 2 can use the data from the sensors 4 to determine whether the consumer electronics device 3 has been dropped by the user 1 a predetermined number of times that indicates a propensity for dropping the consumer electronics device 3. Responsive thereto, the software application 2 can generate the user risk profile 5 to indicate that the user 1 has a propensity to drop the consumer electronics device 3, and, therefore, is associated with a predetermined level of risk to insure.

[0026] In some embodiments, the software application 2 and the consumer electronics device 3 can transmit the user risk profile 5 to a protection and insurance offering system 7 via a network connection, such as a LTE, 4G, WiFi, or any other Internet-based connection, and in some embodiments, the protection and insurance offering system 7 can include a cloud-based server, which can be accessible at a predetermined URL. In some embodiments, the protection and insurance offering system 7 can also receive or retrieve input data 6 from other sources. For example, the input data 6 can include identifications of locations that present an increased risk to the safety of the consumer electronics device 3, identifications of times and dates of events that present an increased risk to the safety of the consumer electronics device 3, identifications of

past interactions of the user 1 with another device, or identifications of any other factors that may impact the risk associated with the user 1 owning and using the consumer electronics device 3.

[0027] Based on the user risk profile 5 and the input data 6, the protection and insurance offering system 7 can generate a risk based policy offering 8 that is customized to the user and the consumer electronics device 3. For example, in some embodiments, the risk based policy offering 8 can include a custom price to insure the consumer electronics device 3 for the user 1, and in some embodiments, the risk based policy offering 8 can include terms and a scope of protection for an insurance or protection plan associated with the user 1 and the consumer electronics device 3. In some embodiments, the risk based policy offering 8 can include a provision in a terms of service associated with the risk based policy offering 8 requiring that the software application 2 be installed on the consumer electronics device 2 at all times during the life of the risk based policy offering 8 and that removal of the software application 2 from the consumer electronics device will void insurance protection associated with the risk based policy offering 8.

[0028] As disclosed herein, a common and constant risk to the consumer electronics device 3 is that the user 1 will drop the consumer electronics device 3, thereby damaging the consumer electronics device 3. For example, if the user 1 drops the consumer electronics device 3 from a sufficient height and in a specific manner, then a screen of the consumer electronics device 3 may shatter. Thus, an important factor measured by the software application 2 and included in the user risk profile 5 is when and how often the user 1 drops the consumer electronics device 3.

[0029] In this regard, the software application 2 can identify a trauma event each time the consumer electronics device 3 is dropped from a height that ends in a hard impact, and the

software application 2 can use the trauma event to create the user risk profile 5. In some embodiments, the software application 2 can communicate with the user 1, such as by generating a notification message (e.g. email notification, push notification) that includes one or more suggested proactive actions to prevent future drops. For example, the one or more suggested proactive actions may include the user 1 purchasing a shock-absorbing case for the consumer electronics device 3, a screen protector for the consumer electronics device, or gripping strips that increase an amount of friction on a housing of the consumer electronics device 3 while being held by the user 1. In some embodiments, the notification message may include one or more reasons for the suggested proactive action, such as data that suggests the user 1 drops the consumer electronics device 3 more than average.

[0030] As disclosed herein, the software application 2 can identify when the consumer electronics device 3 has been dropped. For example, in some embodiments, the software application 2 can monitor the data from the sensors 4, such as the accelerometer, to determine whether the consumer electronics device 3 has been dropped. In some embodiments, the software application 2 can identify an impact level of the consumer electronics device 3 being dropped to differentiate between a damage-inducing drop when the consumer electronics device 3 impacts a hard surface (e.g. a cement floor) and a harmless drop when the consumer electronics device 3 impacts a soft surface (e.g. a couch). In some embodiments, the software application 2 can validate the impact level using the data collected from sensors 4, such as the accelerometer or the gyroscope.

[0031] FIG. 2 is a flow diagram of a method 200 for detecting whether the consumer electronics device 3 has been dropped in accordance with disclosed embodiments. As seen, the method 200 can include starting a background service, as in 3-1. For example, the background

service can be started by installing the software application 2 on the consumer electronics device 3 for continually monitoring the data from the sensors 4 to detect conditions indicative of a drop. In some embodiments, the background service may be unnoticeable to the user 1 during regular use of the consumer electronics device 3.

[0032] The method 200 can also include setting lower and upper threshold values and a time interval, as in 3-2. In some embodiments, the lower and upper threshold values and the time interval can be predetermined, and in some embodiments, the upper threshold can be greater than the lower threshold. For example, the upper threshold value can be set to an acceleration value corresponding with a height at which the consumer electronics device 3 must be dropped to qualify as a damage-inducing drop. Additionally or alternatively, in some embodiments, the lower and upper threshold values can be based on a type of the consumer electronics device 3 on which the software application 2 is installed. For example, an iPhone 8 Plus may be heavier than an iPhone 8 so, when dropped, a force of impact for the iPhone 8 Plus may be higher than the iPhone 8. As such, the software application 2 installed on the iPhone 8 Plus may set the upper threshold value higher than the software application 2 installed on the iPhone 8 sets the upper threshold value. Additionally or alternatively, in some embodiments, the upper and lower threshold values can be identified from the data from the sensors 4, including acceleration values measured by the accelerometer, angular velocity values measured by the gyroscope, and/or orientation values measured by the gyroscope and the magnetometer. In any embodiment, the lower and upper threshold values can be set at values that facilitate identifying drops that follow the same general pattern discussed herein.

[0033] The method 200 can also include the software application 2 determining whether the data from the accelerometer is indicative of a drop, that is, whether the data indicates that an

acceleration of the consumer electronics device 3 exceeded the upper threshold value and subsequently fell below the lower threshold value within the time interval or whether the data indicates that the acceleration of the consumer electronics device 3 initially fell below the lower threshold value, subsequently exceeded the upper threshold value, and subsequently fell below the lower threshold value, as in 3-3. In some embodiments, the accelerometer can include a tri-axial accelerometer with three axes (x-axis, y-axis, and z-axis) for measuring the data in three directions, and the data from the accelerometer can be measured in meters per second squared. When the accelerometer is the tri-axial accelerometer, the software application 2 can calculate a geometric mean of the data associated with the three axes as follows:  $|A_T| = \sqrt{a_x^2, a_y^2, a_z^2}$ . When the conditions of 3-3 have not been met, the software application 2 can repeat 3-3. However, when the conditions of 3-3 have been met, the method 200 can continue to 3-4.

[0034] Pursuant to the method 200, FIG. 3 is a graph 300 plotting accelerometer measurements in accordance with disclosed embodiments and identifies the upper threshold value 302, the lower threshold value 304, and the data indicative of a drop 306. As known by those of ordinary skill in the art, the data from the accelerometer can include the force of gravity (e.g.  $9.81 \text{ m/s}^2$ ). Accordingly, when the consumer electronics device 3 is stationary on a surface, the data from the accelerometer can be 9.81. However, when the consumer electronics device is falling downwards, the data from the accelerometer can be 0. In this regard and as seen in FIG. 3, during the drop, the data from the accelerometer can initially fall below the lower threshold value 304 (e.g. accelerometer data = 0 during free fall), subsequently exceed the upper threshold value 302 (e.g. accelerometer data = 36 upon impacting a surface and bouncing off the surface), and subsequently fall below the lower threshold value 304 (e.g. accelerometer data = 0 during free fall after bouncing off the surface) within the time interval (e.g. 20 ms).

[0035] In some embodiments, after initially falling below the lower threshold value 304, when the data from the accelerometer subsequently exceeds an intermediate threshold value that is below the upper threshold value 302, the method 200 can determine that the consumer electronics device 3 was dropped on a soft surface and, therefore, that the drop was harmless.

[0036] The method 200 can also include the software application 2 determining whether the drop concluded with an impact exceeding an impact threshold value, as in 3-4. For example, in some embodiments, the method 200 can identify an impact level of the consumer electronics device 3 being dropped to differentiate between a damage-inducing drop when the consumer electronics device 3 impacts a hard surface and a harmless drop when the consumer electronics device 3 impacts the soft surface. In this regard, in some embodiments, the method 200 can validate the drop with the data from the sensors 4, such as the data from the gyroscope indicative of the rotation and/or the orientation of the consumer electronics device 3 in azimuth (angle around the x-axis), pitch (angle around the y-axis), and roll (angle around the z-axis) directions ( ${}^0X$ ,  ${}^0Y$ ,  ${}^0Z$ ). In some embodiments, after the data from the accelerometer exceeds the upper threshold value, the software application 2 can calculate a geometric mean of the rotation of the consumer electronics device 3 in degrees per second as follows:  ${}^wT = \sqrt({}^w_x^2, {}^w_y^2, {}^w_z^2)$ . Then, the software application 2 can confirm that the drop was a damage-inducing drop when the geometric mean of the rotation and the orientation exceeds the impact threshold value. In some embodiments, the impact threshold value can be set based on rotation and orientation values of the consumer electronics device 3 impacting a hard surface during a drop and/or dropping and inducing damage, wherein such values can be identified via modeling and testing of consumer electronics devices.

[0037] When the method 200 confirms that the drop was a damage-inducing drop, the method 200 can continue as in 3-5. However, when the method 200 fails to confirm that the drop was a damage-inducing drop, the method 200 can continue as in 3-3, and the software application 2 can confirm that the drop was a harmless drop.

[0038] Finally, the method 200 can include the software application 2 registering the drop on a cloud server, such as the protection and insurance offering system 7, as in 3-5. In some embodiments, registering the drop can include the software application 2 updating a risk profile 5 for the user 1 and the consumer electronics device 3. In this regard, FIG. 4 is a graph 400 plotting a tendency to drop a device in accordance with disclosed embodiments and identifies four drops over a period of time.

[0039] In some embodiments, the software application 2 can set a thrown threshold value that can be lower than the lower threshold value. In these embodiments, when the data from the accelerometer falls below the thrown threshold value, the software application 2 can determine that the consumer electronics device 3 has been thrown, an event that may not be protected by the risk based policy offering 8. Additionally or alternatively, the software application 2 can determine that the consumer electronics device 3 has been thrown upward when the data from the accelerometer increased before initially falling below the lower threshold value.

[0040] When the software application 2 determines that the user 1 has a propensity to drop the consumer electronics device 3 (e.g. a number of drops within a time period exceeds a predetermined threshold value), the protection and insurance offering system 7 can generate a notification message to the consumer electronics device 3 that includes an offer to the user 1 to purchase a case or a screen protector and that can be accompanied by data illustrative of the user 1 having the propensity to drop the consumer electronics device 3. In addition, the protection and

insurance offering system 7 can increase a price of the risk based policy offering 8 in response to determining that the user 1 has the propensity to drop the consumer electronics device 3 and notify the user 1 as such.

[0041] FIG. 5 is a flow diagram of a method 500 for adjusting risk in accordance with disclosed embodiments, for example, by generating a risk profile for the user 1 based on user events and user activities that may affect the risk involved with insuring or protecting the consumer electronics device 3.

[0042] As seen, the method 500 can include starting an event detection process, as in 4-1. In some embodiments, the event detection process can include a background service that operates in conjunction with the background service described in connection with FIG. 2. After beginning the event detection process, the method 500 can include the software application 2 or the protection and insurance offering system 7 identifying the user events and the user activities, as in 4-2, and retrieving identified risk scenarios from an event monitoring database, as in 4-3, to determine whether any of the user events and the user activities matches any of the identified risk scenarios, as in 4-4. If no matches are identified, as in 4-4, then the method 500 can include the software application 2 continuing to monitor for the user events and the user activities, as in 4-2, and retrieve the identified risk scenarios, as in 4-3. However, when the method 500 identifies a match between one of the user events and the user activities and one of the identified risk scenarios, the method 500 can include the software application 2 registering the one of the user events and the user activities identified as in 4-3 on the cloud server, as in 4-5.

[0043] As an example, one of the identified risk scenarios can include the user 1 attending a concert, a sporting event, a street festival, or a political march that has a high risk for the consumer electronics device 3 because the user 1 is likely to capture a video or a photograph

while holding the consumer electronics device 3 at an elevated height or because large crowds associated with such a high risk event increase the likelihood of the consumer electronics device 3 being stolen. The software application 2 can retrieve the identified risk scenario (e.g. concert attendance) and monitor the activities of the user 1 through the consumer electronics device 3 to determine whether the user 1 has purchased or is purchasing a ticket to the concert, for example, by monitoring the user's 1 internet browsing, determining that the consumer electronics device 3 received an email confirming a ticket purchase, or by monitoring the user's 1 text messages. In response to detecting that the user 1 purchased the ticket to the concert, for example, the software application 2 can identify a match with the identified risk scenario and can register the user purchasing the concert ticket purchase on the cloud server, as in 4-5.

[0044] As another example, one of the identified risk scenarios can include the user 1 traveling internationally or to another high risk location. The software application 2 can retrieve the identified risk scenario (e.g. international travel) and monitor the activities of the user 1 to determine whether the user 1 purchased a ticket to, reserved lodging in, or is physically present in an international location, a specific country particularly associated with risk (e.g. a developing country), or a risky or unsafe geographic location (e.g. a high crime neighborhood), for example, by monitoring a destination address entered by the user 1 into navigation software (e.g. Waze, Google Maps) or by monitoring GPS coordinates of the consumer electronics device 3 relative to GPS coordinates of the international location, the specific country particularly associated with risk, or the risky or unsafe geographic location. In response to detecting the user 1 purchasing the ticket to the international location, for example, the software application 2 can identify a match with the identified risk scenario and can register the user 1 purchasing the ticket to the international location on the cloud server, as in 4-5.

[0045] In some embodiments, when the software application 2 determines that one of the user events and the user activities matches one of the identified risk scenarios, the protection and insurance offering system 7 can generate a notification message to the consumer electronics device 3 that includes an offer to the user 1 to purchase added protection or insurance at any time prior to the user attending or travelling to the one of the identified risk scenarios to provide enhanced protection or heightened insurance for any or all portions of the user attending or travelling to the one of the identified risk scenarios.

[0046] Like FIG. 5, FIG. 6 is a flow diagram of a method 600 for adjusting risk and generating warnings in accordance with disclosed embodiments, for example, by monitoring the user activities of the user 1 within other applications executed by the consumer electronics device 3. In doing so, the method 200 can identify risky behavior of the user 1 through the consumer electronics device 3 and offer an insurance or protection plan through the protection and insurance offering system 7 for more than just the consumer electronics device 3. For example, the protection and insurance offering system 7 can offer insurance or protection for data stored on the consumer electronics device 3, stationary electronics in a home of the user 1, or actions of the user 1.

[0047] As seen, the method 600 can include starting an actions monitoring process, as in 10-1. In some embodiments, the actions monitoring process can include a background service that operates in conjunction with the background service described in connection with FIG. 2 or the event detection process described in connection with FIG. 5. After beginning the actions monitoring process, the method 600 can include the software application 2 identifying applications and actions that have a pertinence for insurance from a database, as in 10-2, and identifying the user events and the user activities, as in 4-2, to determine whether any of the user

events and the user activities matches any of the applications and actions that have a pertinence for insurance, as in 10-3. The method 600 can determine the user activities by monitoring a user interface or touchscreen of the consumer electronics device 3. If none of the user events and the user activities identified as in 4-2 matches the applications and the actions identified as in 10-2, then the method 600 can include the software application 2 continuing to monitor for the user events and the user activities, as in 4-2. However, if one of the user events and the user activities identified as in 4-2 matches one of the applications and the actions identified as in 10-2, then the method 600 can include the software application 2 registering the one of the user events and the user activities identified as in 4-3 on the cloud server, as in 4-5

[0048] Finally, the method 600 can include determining whether the one of the user events and the user activities identified as in 4-2 requires a notification message for warning the user 1, as in 10-5. If so, then the notification message can be generated and audibly or visibly presented to the user 1, as in 10-6.

[0049] As an example, one of the applications and the actions identified as in 10-2 can include an application that controls a home security system of the user 1. When the software application 2 determines, through GPS data, that the user 1 is away from home, the software application 2 can determine whether the user 1 has armed the home security system via the application that controls the home security system. When the user 1 has failed to arm the home security system via the application that controls the home security system, the software application 2 can generate a notification message to remind the user 1 to arm the home security system via the application that controls the home security system. Failure to consistently arm the home security system or respond to reminders to do so can result in increased costs in the risk based policy offering 8.

[0050] As another example, one of the applications and the actions identified as in 10-2 can include an application that backs up data stored on the consumer electronics device 3. The software application 2 can monitor the user 1 backing up the consumer electronics device 3 via the application that backs up data stored on the consumer electronics device 3, and upon a failure to backup within a predetermined period of time, the software application 2 can offer a service to back up the data stored on the consumer electronics device 3 via the risk based policy offering 8 and/or automatically back up the consumer electronics device 3.

[0051] Generally, the cost to repair or replace the consumer electronics device 3 drops precipitously over time. For example, FIG. 7 is a graph plotting device depreciation for an iPhone 6s mobile device, an iPhone X mobile device, and a Samsung Galaxy S6 mobile device. As shown in FIG. 7, 70-80% of a device's value is lost after one year. Accordingly, systems and methods disclosed herein can offer a discounted insurance plan based on the device depreciation.

[0052] FIG. 8 is a flow diagram of a method 800 for accounting for device depreciation in accordance with disclosed embodiments, for example, by basing a price of an insurance offering on depreciated value. For example, the consumer electronics device 3 can depreciate from a launch date regardless of when the consumer electronics device 3 was purchased because newer versions are always being developed. In this regard, the iPhone 8 launched in October, 2017 at a release price of \$750 and continued to sell at that price for an extended period of time thereafter. Nevertheless, a value of the iPhone 8 depreciated approximately 1% per week with a floor determined by demand in the marketplace.

[0053] As seen in FIG. 8, the method 800 can include determining a make and a model of the consumer electronics device, as in 801, and identifying a replacement cost percentage of the

consumer electronics device 3, as in 802. In some embodiments, the replacement cost percentage can be identified as follows:

$$\text{Replacement cost percent reduction} = \frac{(\text{release price} - \text{ASP})}{\text{release price}} * 100$$

where the release price can be a retail price of the consumer electronics device 3 when the consumer electronics device 3 was first launched and where ASP can be an average selling price of the consumer electronics device 3 on a secondary market. ASP can be updated monthly or at some other periodic interval. In some embodiments, the method 800 can factor additional variables into the replacement cost percentage, such as months since the launch date, device attributes, seasonal effects, macro variables, and worldwide or geographical calamities (e.g. political turmoil that affects trade or a typhoon in Asia that halts trading, thereby impacting a supply of consumer electronics devices in North America), each of which can be assigned a coefficient and incorporated into the equation used for identifying the replacement cost percentage.

[0054] Then, the method 800 can include comparing the replacement cost percentage to a threshold value as in 804. When the replacement cost percentage exceeds the threshold value, the method 800 can include extending a discounted insurance offering to the user 1, as in 806. For example, if a smartphone was purchased on January 1, 2018 for \$1,000 (e.g. release price) and is valued on December 1, 2019 at \$300 (e.g. ASP), then the replacement cost percentage can be 70%, and the method 800 can offer the discounted insurance offering with a 50% discount.

[0055] Some technology for consumer electronics devices can increase a durability of the consumer electronics device 3. For example, some smartphones can include organic light emitting diode (OLED) displays. In addition to higher display quality, OLED displays can have higher durability and a lower propensity for cracks and scratches. Indeed, testing has shown that

an iPhone 7 having an OLED screen breaks only 6% of the time when dropped from a distance of ten feet whereas an iPhone 6 having an LCD screen breaks 74% of the time when dropped from the same distance and that the iPhone 7 has a decreased chance of damage to a back glass, a back camera, a front camera, and a loud speaker as compared to the iPhone 6. Accordingly, systems and methods disclosed herein can offer a discounted insurance plan based on device durability.

[0056] FIG. 9 is a flow diagram of a method 900 for accounting for device durability in accordance with disclosed embodiments, for example, by basing a price of an insurance offering on the device durability. As seen, the method 900 can include starting a risk assessment process, as in 6-1. In some embodiments, the risk assessment process can include a background service that operates in conjunction with the background service described in connection with FIG. 2, the event detection process described in connection with FIG. 5, or the actions monitoring process 10-1 described in connection with FIG. 7. After starting in the risk assessment process, the method 900 can include determining a make and a model of the consumer electronics device 3, as in 6-2, for example, by referencing data stored on the consumer electronics device 3, a profile of the user 1 stored by the protection and insurance offering system 7, or a TCP/IP packet sent over the Internet. Then, the method 900 can include retrieving a device durability index rating associated with the make and the model from a device durability index database, as in 6-3, and determining whether the device durability index rating exceeds a predetermined threshold value, as in 6-4. When the device durability index rating exceeds the predetermined threshold value, as in 6-4, the method 900 can include the protection and insurance offering system 7 offering a discounted rate.

[0057] In some embodiments, systems and methods disclosed herein can also include creating and populating the device durability index database with a respective device durability index rating for each of a plurality of makes and each of a plurality of models based on significant diagnostic testing of the plurality of makes and the plurality of models and aggregate data thereof. Additionally or alternatively, systems and methods disclosed herein can identify the respective device durability rating for each of the plurality of makes and each of the plurality of models from a respective part durability rating for each of a plurality of parts forming a respective device.

[0058] In some situations, the consumer electronics device 3 may be broken, but the user 1 may wish to protect remaining functional components of the consumer electronics device 3.

FIG. 10 is a flow diagram of a method 1000 for generating a protection plan based on device diagnostics in accordance with disclosed embodiments, for example, by generating a specialized insurance plan based on results of a diagnostics test.

[0059] As seen, the method 1000 can include the software application 2 executing a diagnostics test, as in 9-2 and, based on results of the diagnostics test, determining whether all components of the consumer electronics device 3 are functional, as in 9-3. When the diagnostics test indicates that all components of the consumer electronics device 3 are fully functional, the method 1000 can include the software application 2 generating a report indicative thereof, and the protections and insurance offering system 7 can offer a standard rate insurance plan, as in 9-4. However, when the diagnostics test indicates that one or more of the components of the consumer electronics device 3 is non-functional, the software application 2 can generate a report that identifies an exclusionary list that includes the components of the consumer electronics device 3 that failed the diagnostics test, as in 9-5. Then, the method 1000 can include the

software application 2 transmitting the exclusionary list to the protections and insurance offering system 7, which can use the exclusionary list to reference a protection offering database, as in 5-3, and provide a specialized offer with exclusions, as in 9-6.

[0060] For example, if the diagnostics test reveals that a front camera of the consumer electronics device 3 is non-functional, then the protection and insurance offering system 7 can offer an insurance plan that excludes protection of the front camera and is discounted accordingly. In some embodiments, an amount of a discount can be based on a percentage of insurance claims that claim damage to such a non-functional component (e.g. the front camera). For example, if relatively few insurance claims claim damage to the front camera (e.g. 10%), then a price of the insurance plan can be discounted a relatively small amount (e.g. 5% discount). Alternatively, if a screen of the consumer electronics device 3 is cracked and, therefore, the non-functional component, and a relatively high number of insurance claims claim damage to the screen (e.g., 75%), then the discount can be higher (e.g. 45% discount).

[0061] In some embodiments, the discount can be based on a relative value of the non-functional component toward an overall value of the consumer electronics device 3. Additionally or alternatively, in some embodiments, the discount can be based on a price to repair the non-functional component. For example, if the price to repair the non-functional component is higher than functioning components of the consumer electronics device 3, then the discount can be higher than if the price to repair the non-functional component were lower than the functioning components.

[0062] The systems and methods disclosed herein present a substantial advancement over the prior art by identifying a price to insure a consumer electronics device based on data from sensors of the consumer electronics device itself. Furthermore, the systems and methods

disclosed herein improve upon the prior art by continually monitoring and detecting data related to risk-creating events and actions of the consumer electronics device, the health of the consumer electronics device, and the overall condition of the consumer electronics device via a software application executing and operating in the background of the consumer electronics device without disrupting other functions or applications executed by the consumer electronics device. Finally, the systems and methods disclosed herein are an improvement to the prior art because the systems and methods disclosed herein interact with the sensors of the consumer electronics device itself, thereby facilitating the consumer electronics device regularly monitoring its own health to protect itself from damage.

[0063] Although a few embodiments have been described in detail above, other modifications are possible. For example, the logic flows described above do not require the particular order described or sequential order to achieve desirable results. Other steps may be provided, steps may be eliminated from the described flows, and other components may be added to or removed from the described systems. Other embodiments may be within the scope of the invention.

[0064] From the foregoing, it will be observed that numerous variations and modifications may be effected without departing from the spirit and scope of the invention. It is to be understood that no limitation with respect to the specific system or method described herein is intended or should be inferred. It is, of course, intended to cover all such modifications as fall within the spirit and scope of the invention.

## CLAIMS

What is claimed is:

1. A method comprising:  
receiving first data from a first sensor of a consumer electronics device; and  
determining whether the first data indicates or is associated with a risk to the consumer electronics device, and responsive thereto, saving first information indicating that the consumer electronics device has been exposed to the risk.
2. The method of claim 1 further comprising:  
determining that the first data indicates or is associated with the risk to the consumer electronics device when the first data exceeds a first threshold and subsequently falls below a second threshold within a first time period,  
wherein the first information indicates that the consumer electronics device has been dropped.
3. The method of claim 2 wherein the first sensor is an accelerometer.
4. The method of claim 2 further comprising:  
determining that the first data indicates or is associated with the risk to the consumer electronics device when the first data falls below a third threshold that is lower than the second threshold or when the first data increases before exceeding the first threshold,  
wherein the first information indicates that the consumer electronics device has been thrown.
5. The method of claim 2 further comprising:  
receiving second data from a second sensor of the consumer electronics device;  
determining whether the second data exceeds a third threshold; and  
when the second data exceeds the third threshold, saving second information indicating that the consumer electronics device impacted a hard surface after being dropped.

6. The method of claim 5 wherein the second sensor is a gyroscope.
7. The method of claim 1 further comprising:  
generating a notification message including an offer to purchase an additional component for the consumer electronics device to protect the consumer electronics device; and  
displaying the notification message on a display of the electronics device.
8. The method of claim 1 further comprising updating a risk profile for a user of the consumer electronics device with the first information.
9. The method of claim 8 further comprising increasing a cost of an insurance premium for insuring the consumer electronics device in response to the risk profile indicating that the user has a propensity for dropping the consumer electronics device.
10. The method of claim 1 further comprising:  
retrieving a plurality of identified scenarios from an event monitoring database;  
determining that the first data indicates or is associated with the risk to the consumer electronics device when the first data is indicative of an activity of a user of the consumer electronics device that matches one of the plurality of identified scenarios.
11. The method of claim 10 wherein the first data indicates that the user intends to be physically present at a risky location or event, and wherein the one of the plurality of identified scenarios is a presence at the risky location or event.
12. The method of claim 11 wherein the first sensor is a touchscreen of the consumer electronics device.
13. The method of claim 11 further comprising mining Internet browsing activity, GPS activity, email activity, or user interaction associated with the consumer electronics device to detect the first data.

14. The method of claim 10 wherein the first sensor is a global positioning sensor of the consumer electronics device, wherein the first data indicates that the user is physically present at a risky location or event, and wherein the one of the plurality of identified scenarios is a presence at the risky location or event

15. The method of claim 10 further comprising:

generating a notification message including an offer to insure or add additional insurance for the consumer electronics device while the user is engaging in the activity; and  
displaying the notification message on a display of the consumer electronics device.

16. The method of claim 1 wherein the first data includes an interaction or a lack of interaction by the user with an application executed by the consumer electronics device.

17. The method of claim 16 further comprising generating a notification message reminding the user to interact with the application or to stop interacting with the application.

18. The method of claim 17 further comprising:

increasing a price of an insurance plan associated with the consumer electronics device responsive to detecting a lack of a response to the notification message.

19. A consumer electronics device comprising:

a memory device;

a first sensor that generates first data; and

a processor that receives the first data from the first sensor, determines whether the first data indicates or is associated with a risk to the consumer electronics device, and responsive thereto, saves first information in the memory device indicating that the consumer electronics device has been exposed to the risk.

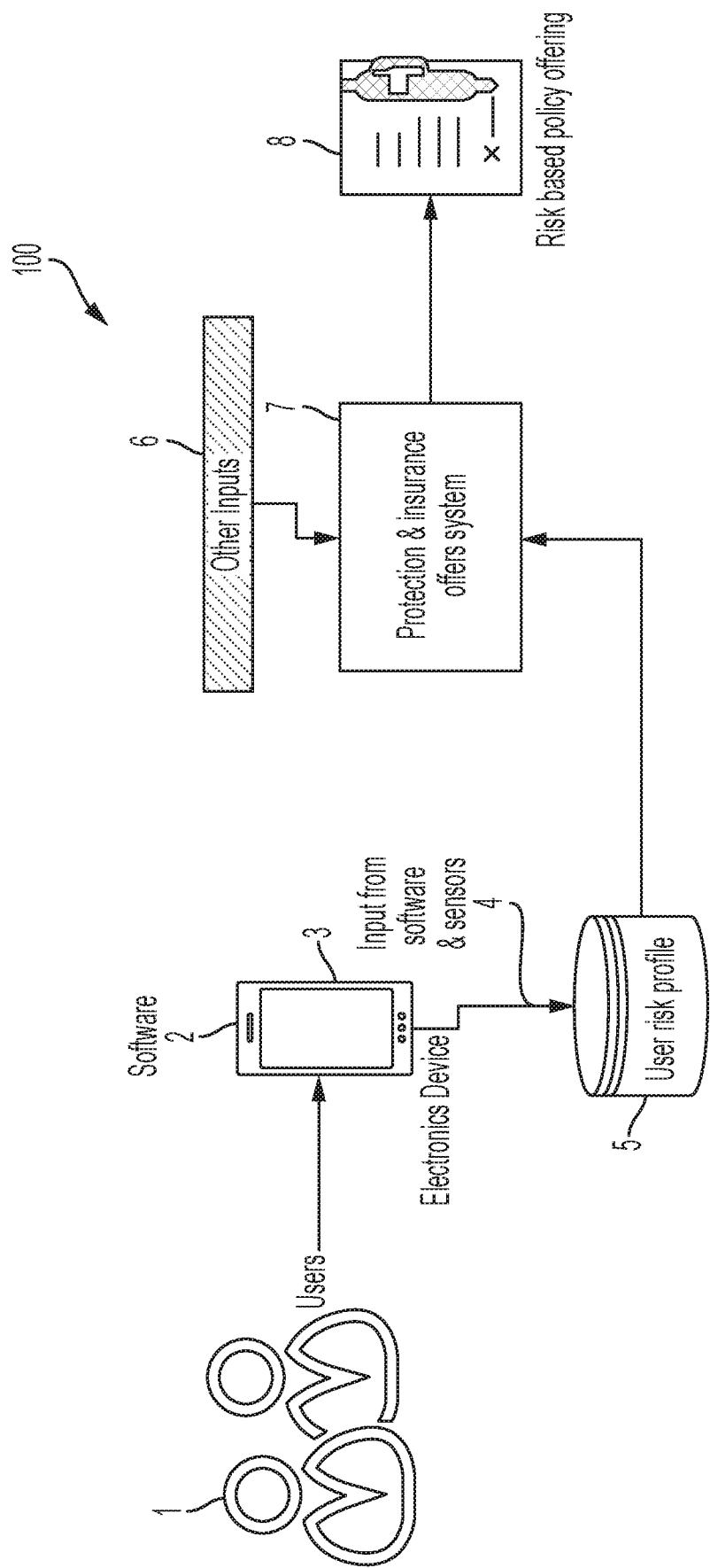
20. A method comprising:

receiving data from a sensor of a consumer electronics device;

determining that the first data exceeded a first threshold and subsequently fell below a second threshold within a time period, and responsive thereto, saving information indicating that the consumer electronics device has been dropped;

updating a risk profile for a user of the consumer electronics device with the information; and

increasing a cost of an insurance premium for insuring the consumer electronics device in response to the risk profile indicating that the user has a propensity for dropping the consumer electronics device.



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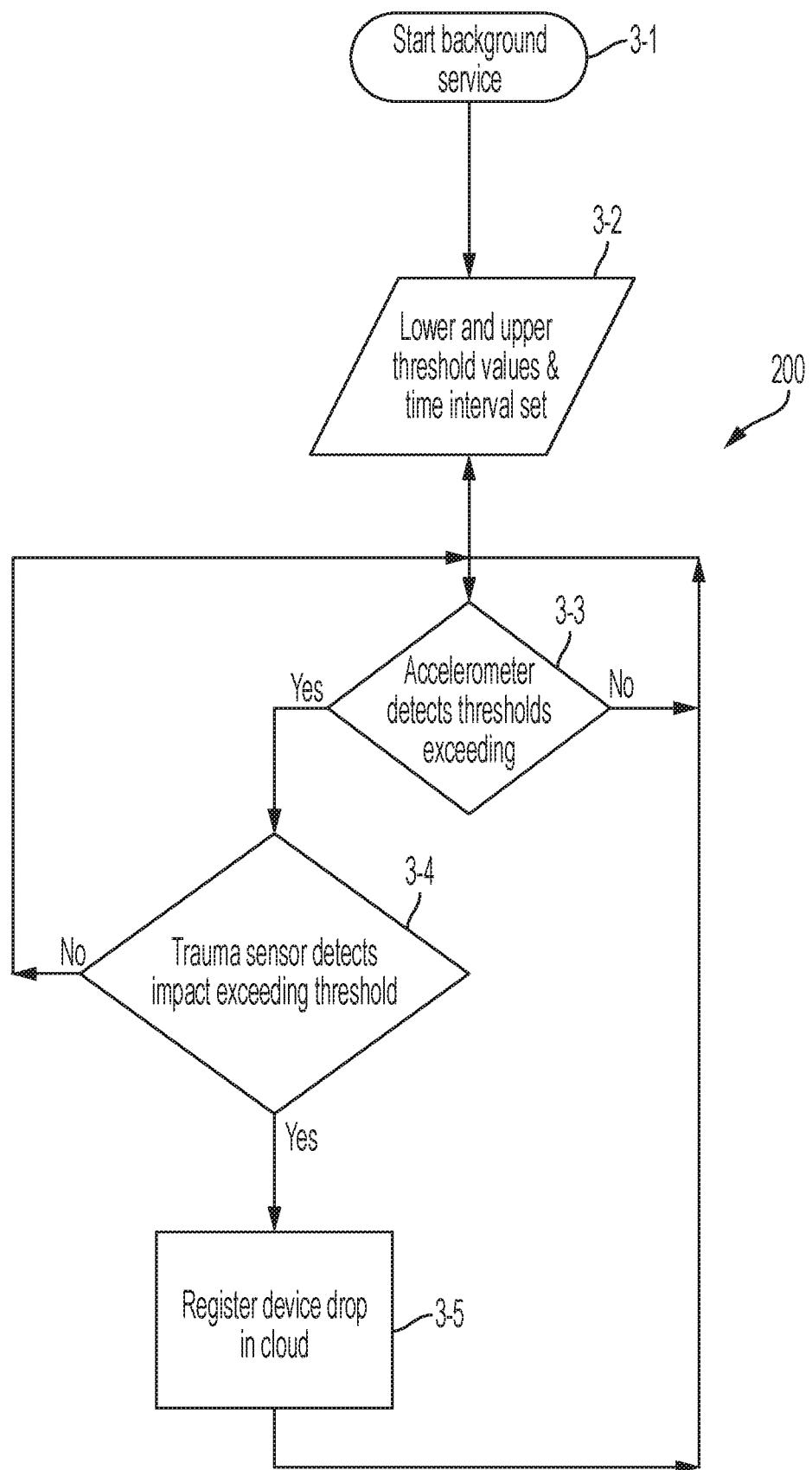


FIG. 2

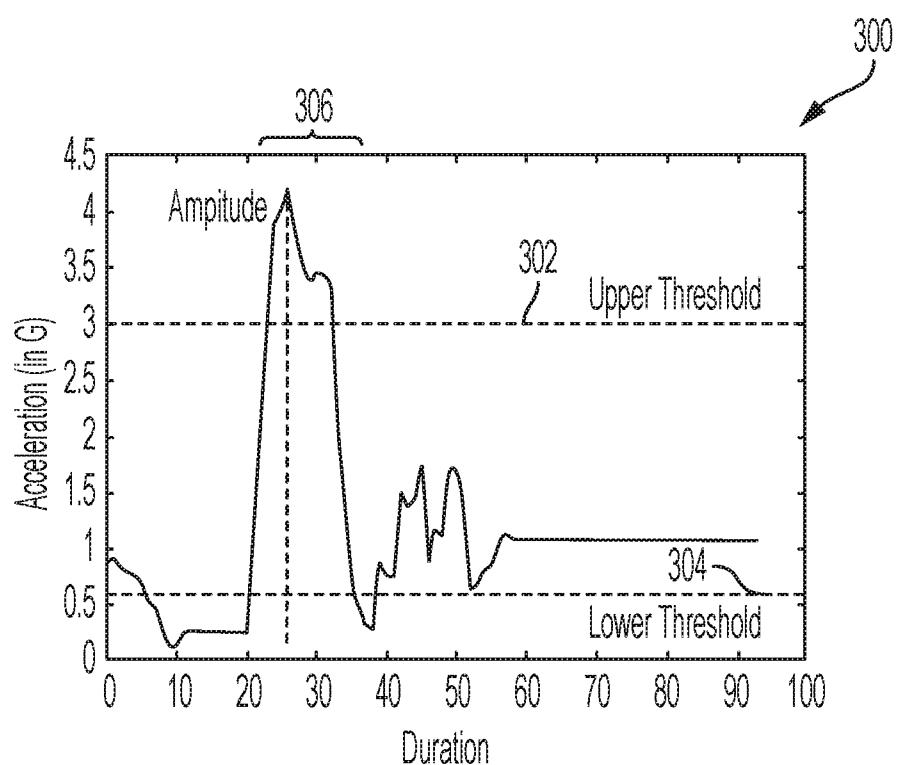


FIG. 3

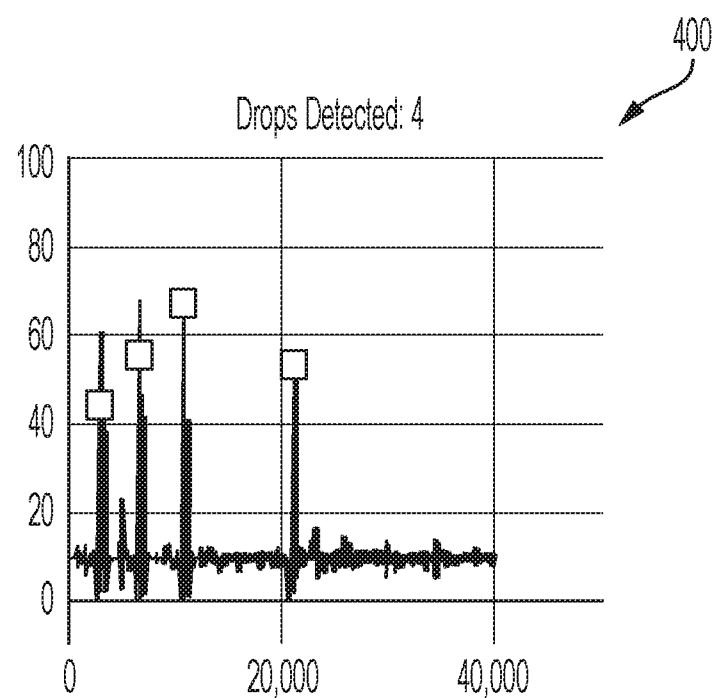


FIG. 4

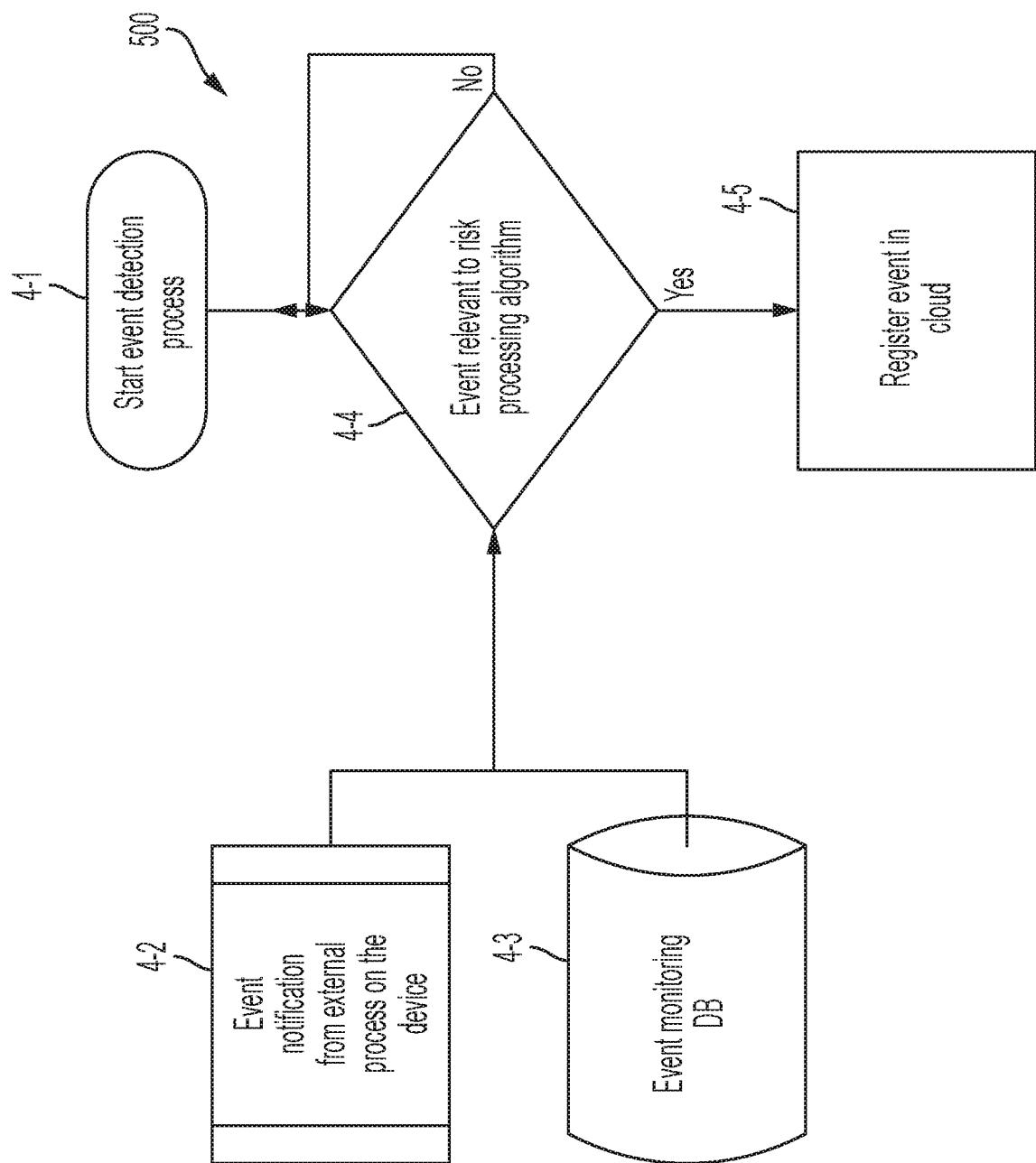


FIG. 5

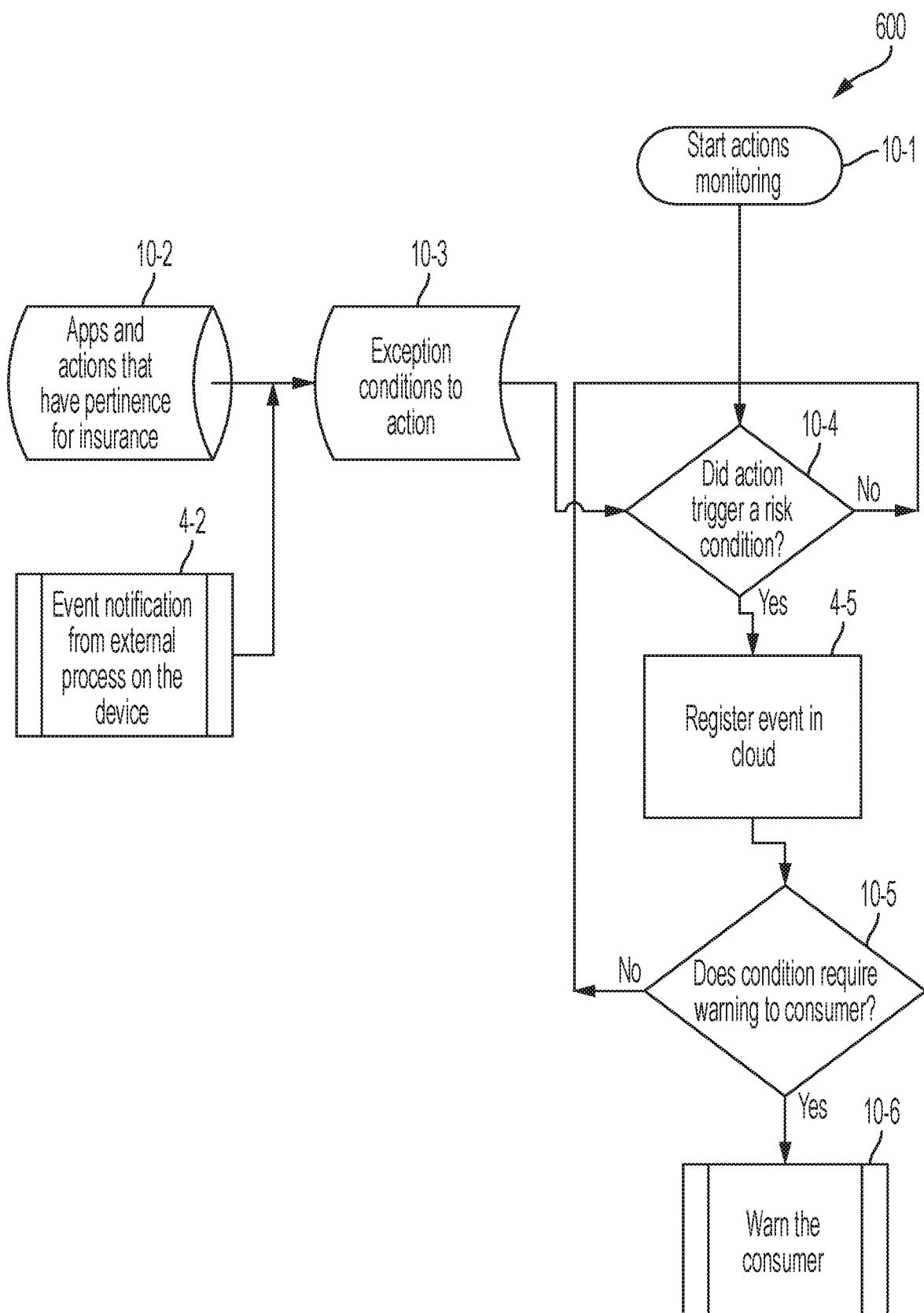


FIG. 6

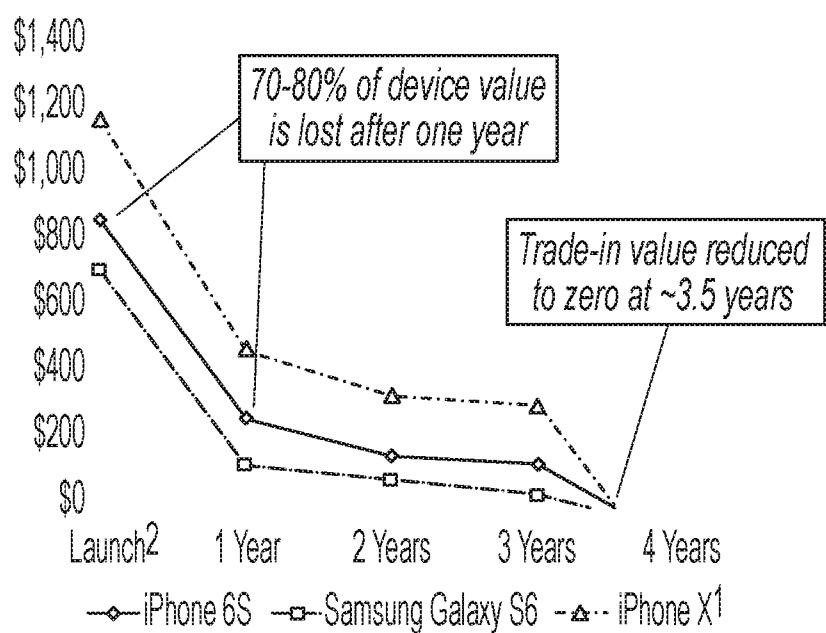


FIG. 7

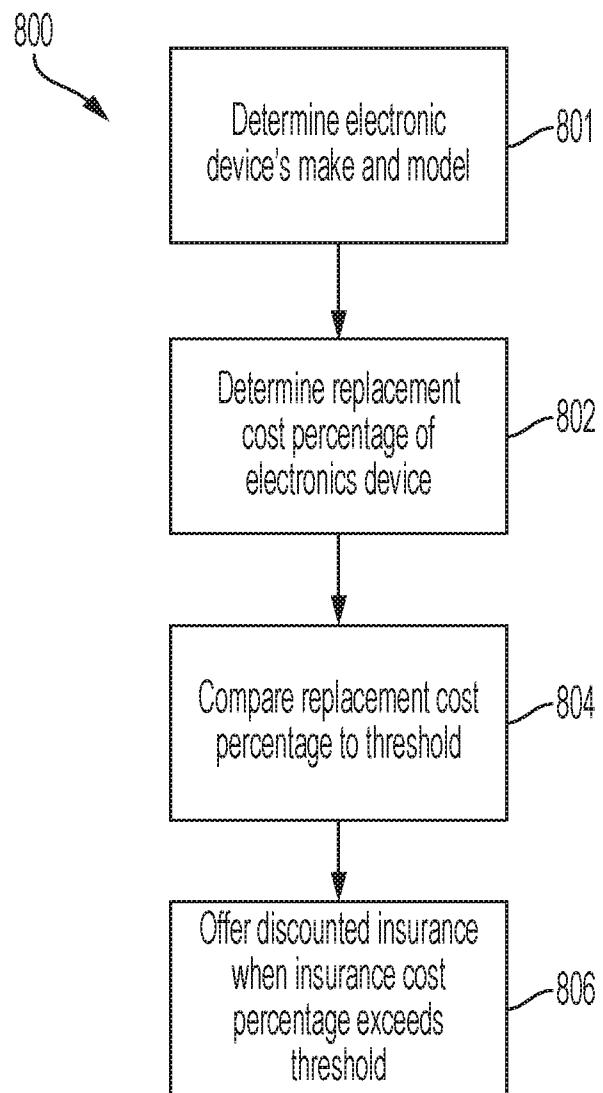


FIG. 8

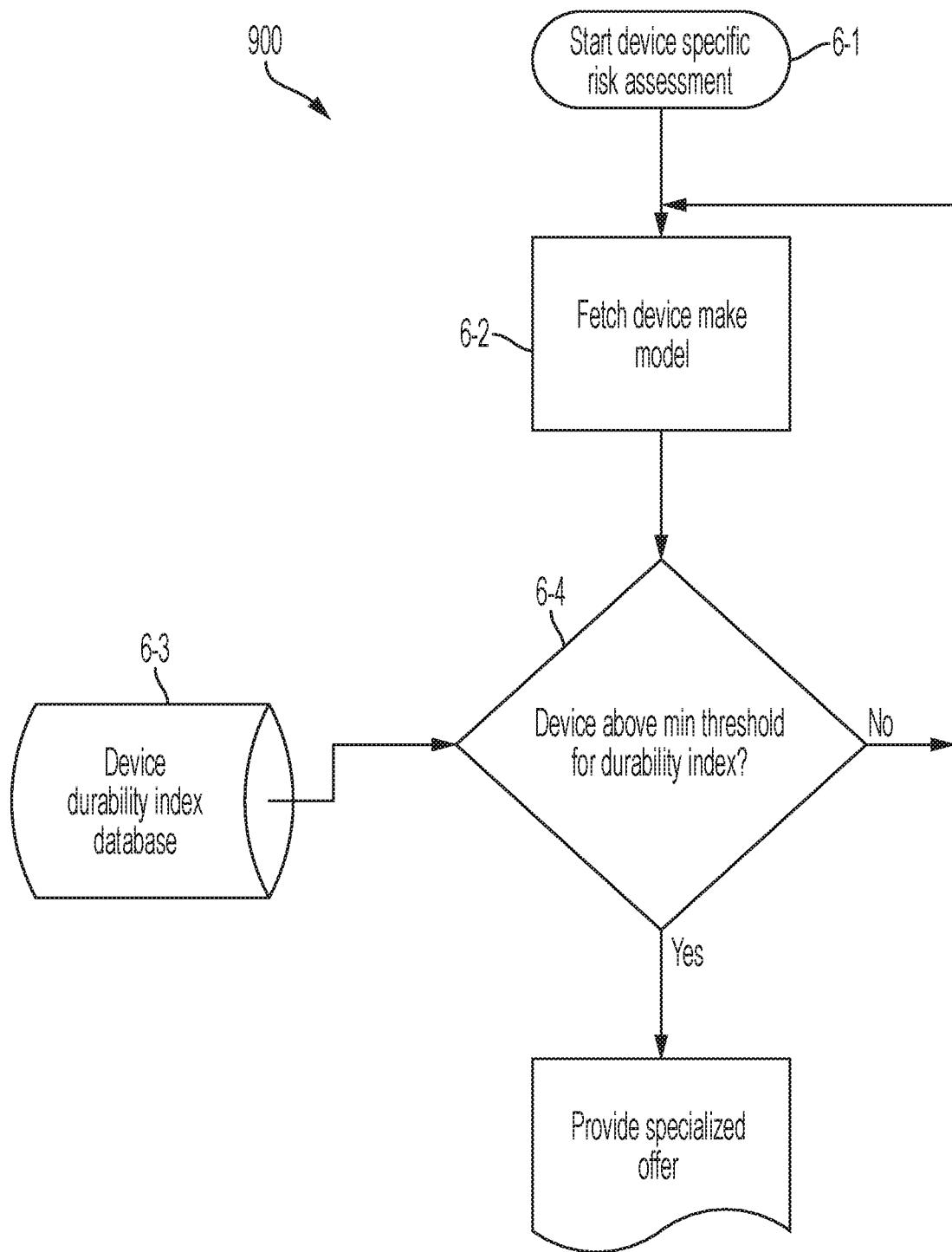


FIG. 9

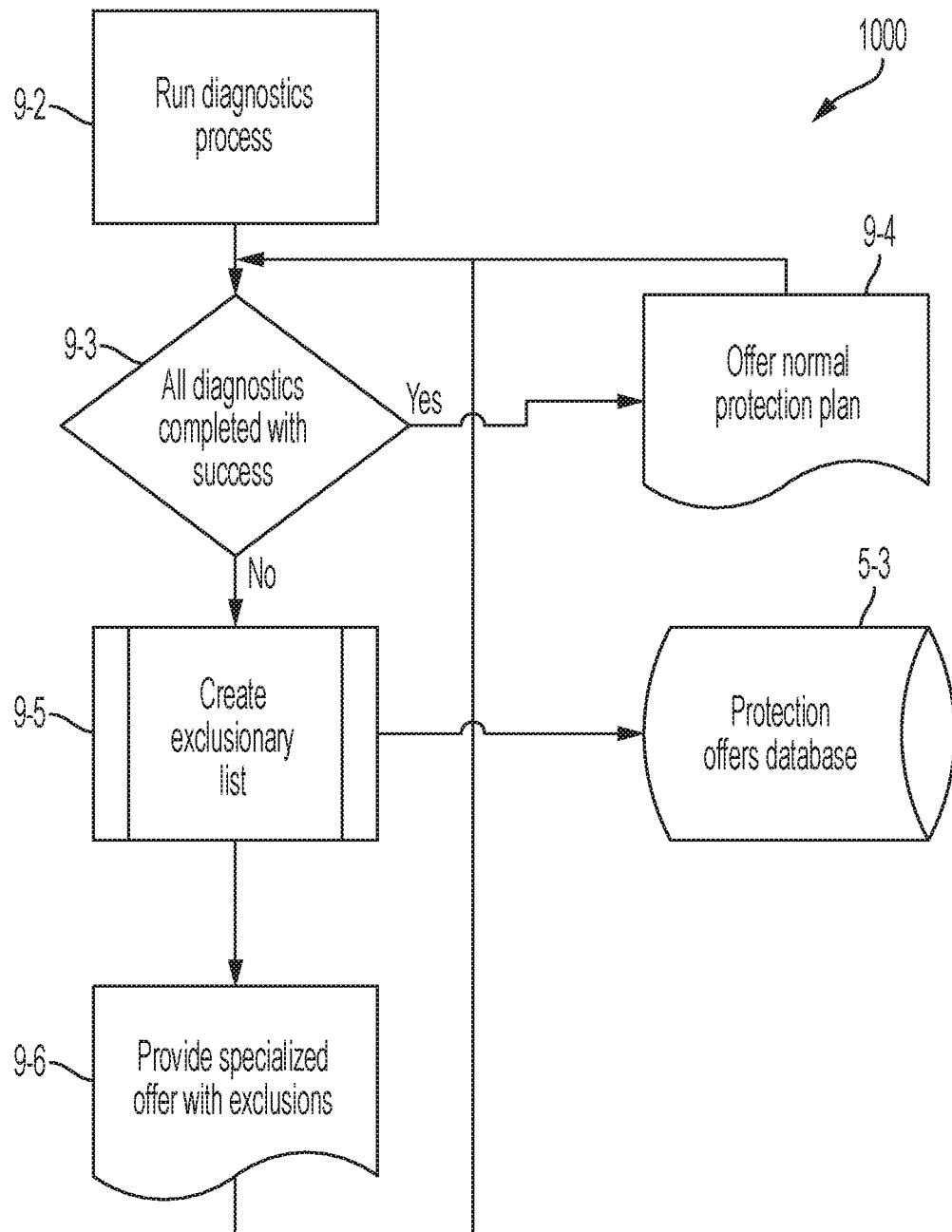


FIG. 10

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2019/030773

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G06Q 40/08; G08B 21/00; H04M 1/24 (2019.01)

CPC - G06Q 40/08; G06Q 10/0635; H04M 1/24; H04M 1/247; H04M 1/2471 (2019.05)

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC - 340/686.1; 705/4; 705/7.28 (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History document

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012/0029947 A1 (WOOLDRIDGE et al) 02 February 2012 (02.02.2012) entire document	1, 8-16, 19
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Y	US 2005/0046580 A1 (MIRANDA-KNAPP et al) 03 March 2005 (03.03.2005) entire document	2-7, 17, 18, 20
Y	US 2015/0113421 A1 (MCAFEE, INC.) 23 April 2015 (23.04.2015) entire document	2-6, 20
Y	US 2010/0073160 A1 (GILMOUR et al) 25 March 2010 (25.03.2010) entire document	7
A	US 2013/0319882 A1 (BERKOVIC) 05 December 2013 (05.12.2013) entire document	17, 18
A	US 2017/0256051 A1 (HYLA, INC.) 07 September 2017 (07.09.2017) entire document	4
		1-20

 Further documents are listed in the continuation of Box C. See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 June 2019	15 JUL 2019
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774