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(54) **SYSTEMS AND METHODS FOR GENERATING CONTEXTUALLY RELEVANT DEVICE PROTECTIONS**

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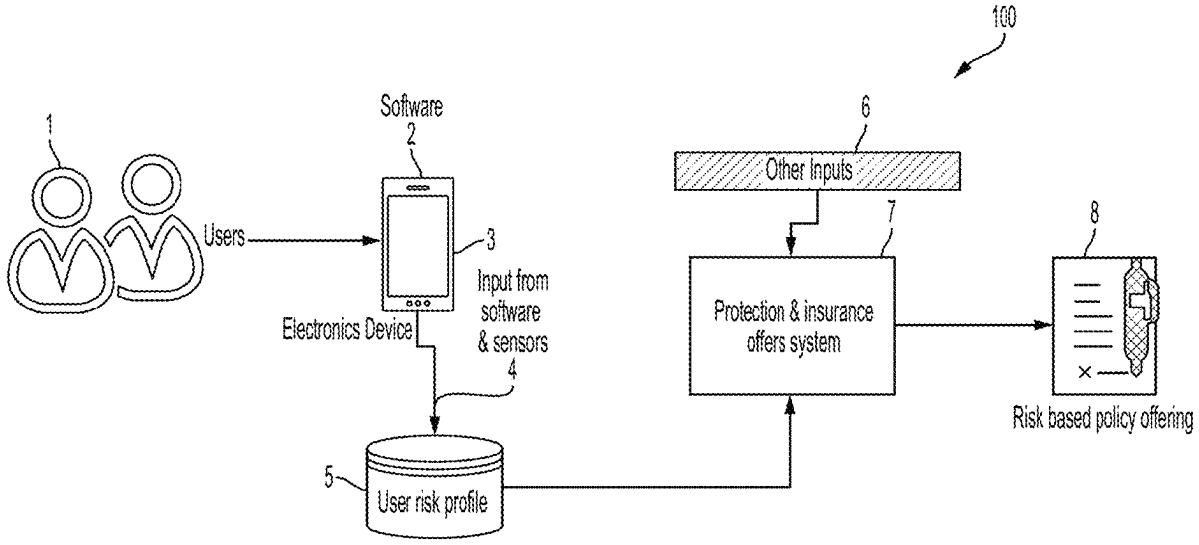
CPC ***G06Q 40/08*** (2013.01)

(57) **ABSTRACT**

Systems and methods are disclosed herein that can detect at least one activity by parsing text from an operation of a consumer electronics device and determine that the at least one activity matches a risk scenario. The at least one activity may be identified by the at least one processor as occurring in the future.



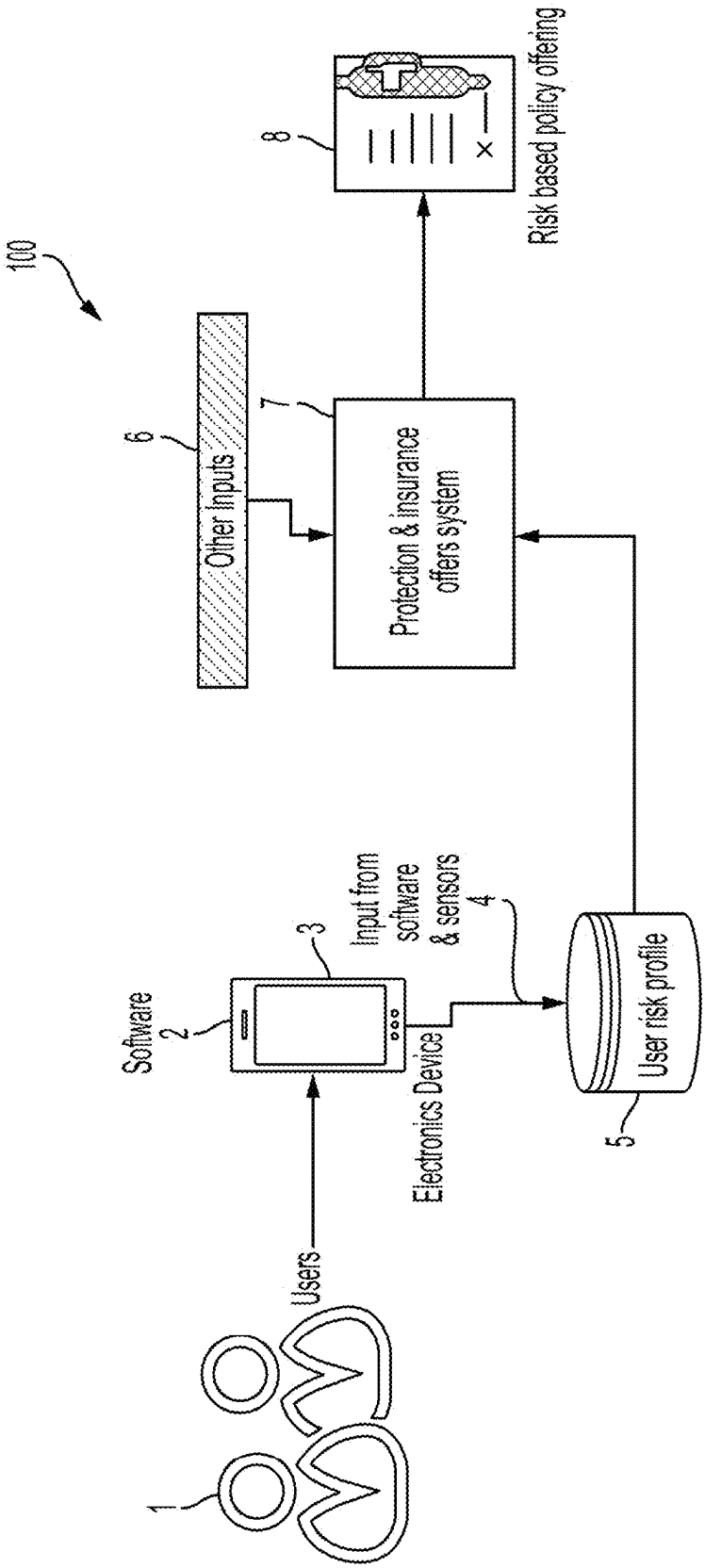

100
8
Risk based policy offering
6
Other inputs
7
Protection & insurance offers system
Software
2
3
Input from software & sensors
4
Electronics Device
User risk profile
5
Users
1

FIG. 1

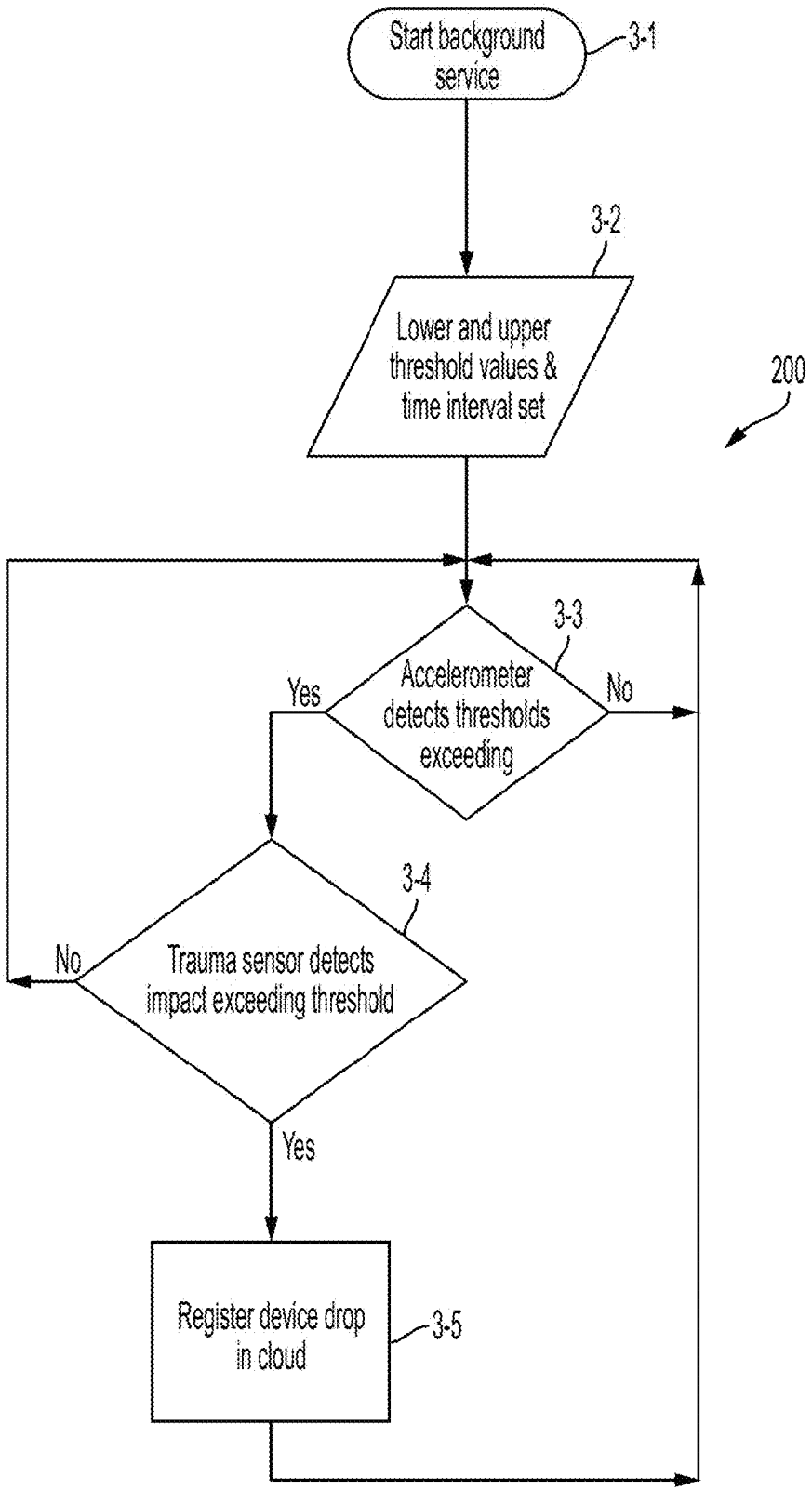

Start background service
3-1
3-2
Lower and upper threshold values & time interval set
200
3-3
Accelerometer detects thresholds exceeding
Yes
No
3-4
Trauma sensor detects impact exceeding threshold
No
Yes
Register device drop in cloud
3-5

FIG. 2

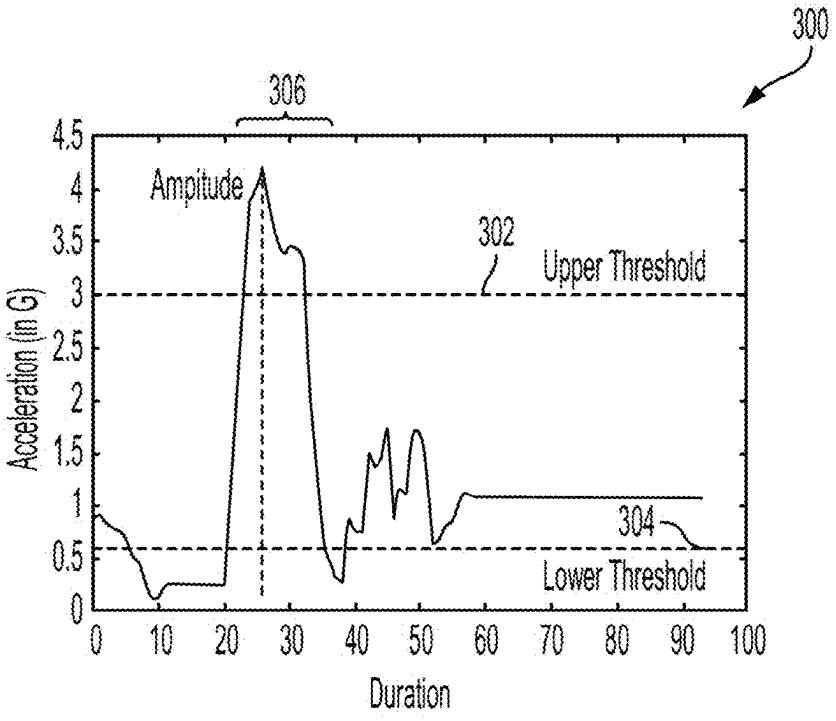

300
306
Amplitude
302
Upper Threshold
304
Lower Threshold
Acceleration (in G)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Duration

FIG. 3

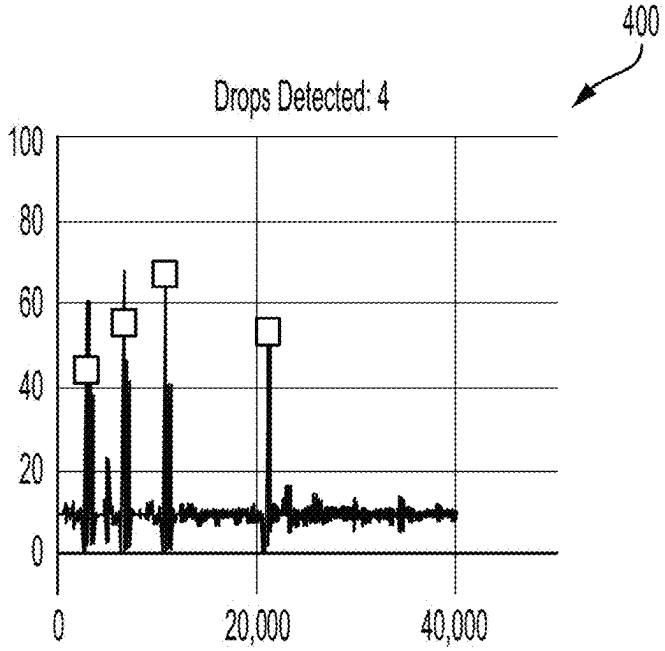


FIG. 4

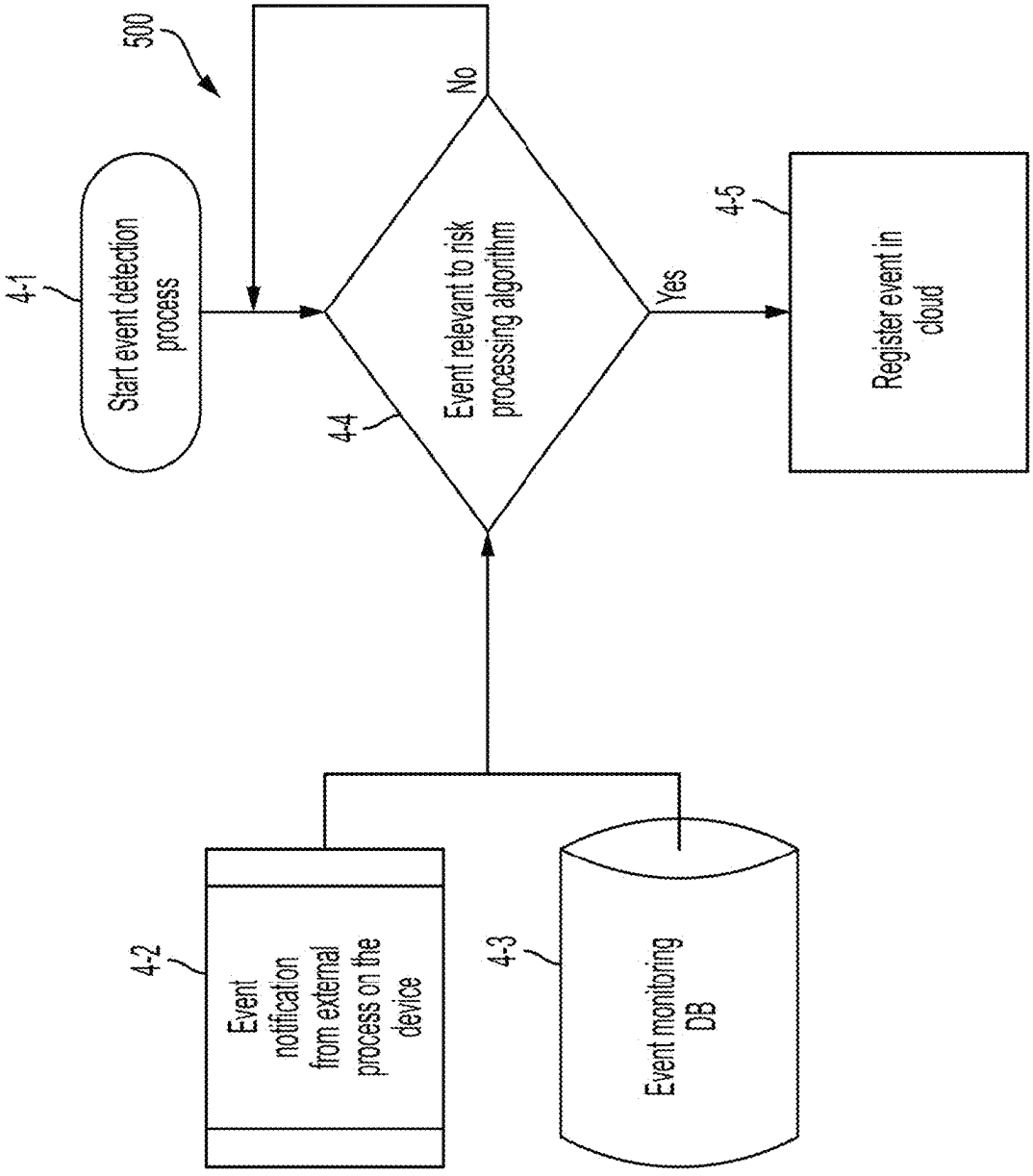

500
No
4-1
Start event detection process
Event relevant to risk processing algorithm
4-4
Yes
4-5
Register event in cloud
4-2
Event notification from external process on the device
4-3
Event monitoring DB

FIG. 5

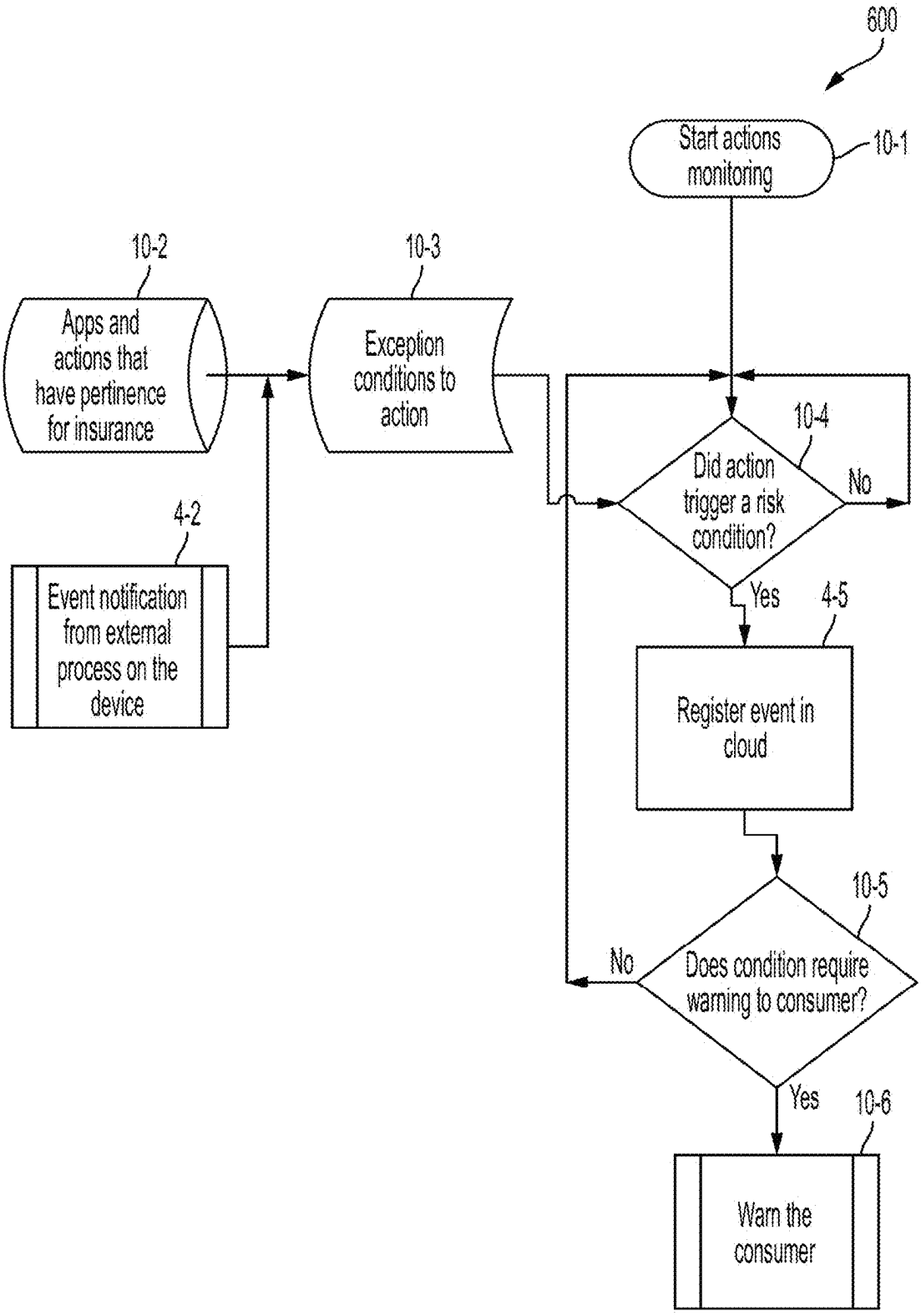

600
Start actions monitoring
10-1
10-2
Apps and actions that have pertinence for insurance
10-3
Exception conditions to action
10-4
Did action trigger a risk condition?
No
Yes
4-5
Register event in cloud
4-2
Event notification from external process on the device
10-5
Does condition require warning to consumer?
No
Yes
10-6
Warn the consumer

FIG. 6

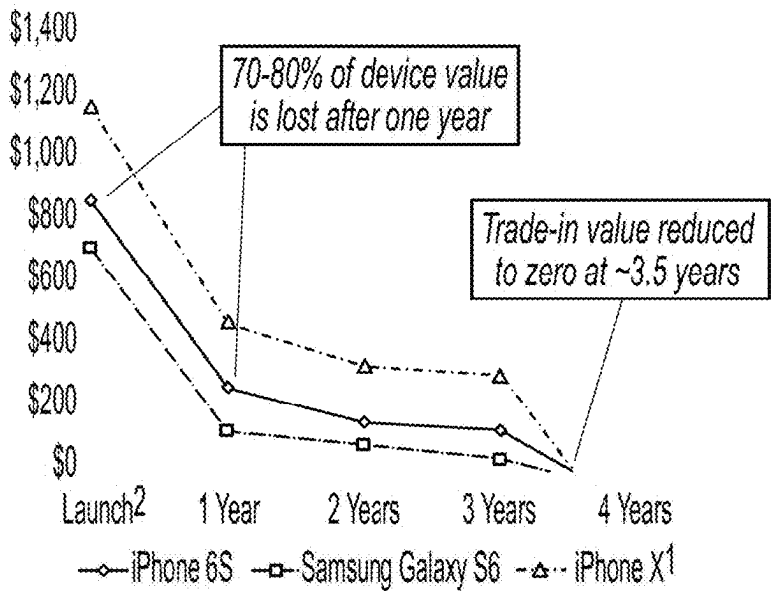

$1,400
$1,200
$1,000
$800
$600
$400
$200
$0
70-80% of device value is lost after one year
Trade-in value reduced to zero at ~3.5 years
Launch2
1 Year
2 Years
3 Years
4 Years
iPhone 6S
Samsung Galaxy S6
iPhone X1

FIG. 7

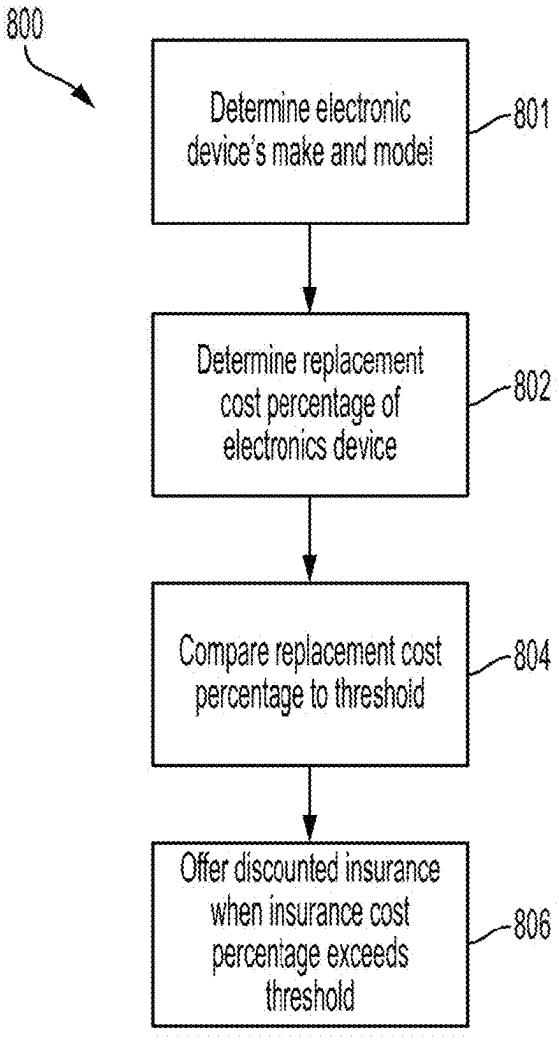

800
Determine electronic device's make and model
801
Determine replacement cost percentage of electronics device
802
Compare replacement cost percentage to threshold
804
Offer discounted insurance when insurance cost percentage exceeds threshold
806

FIG. 8

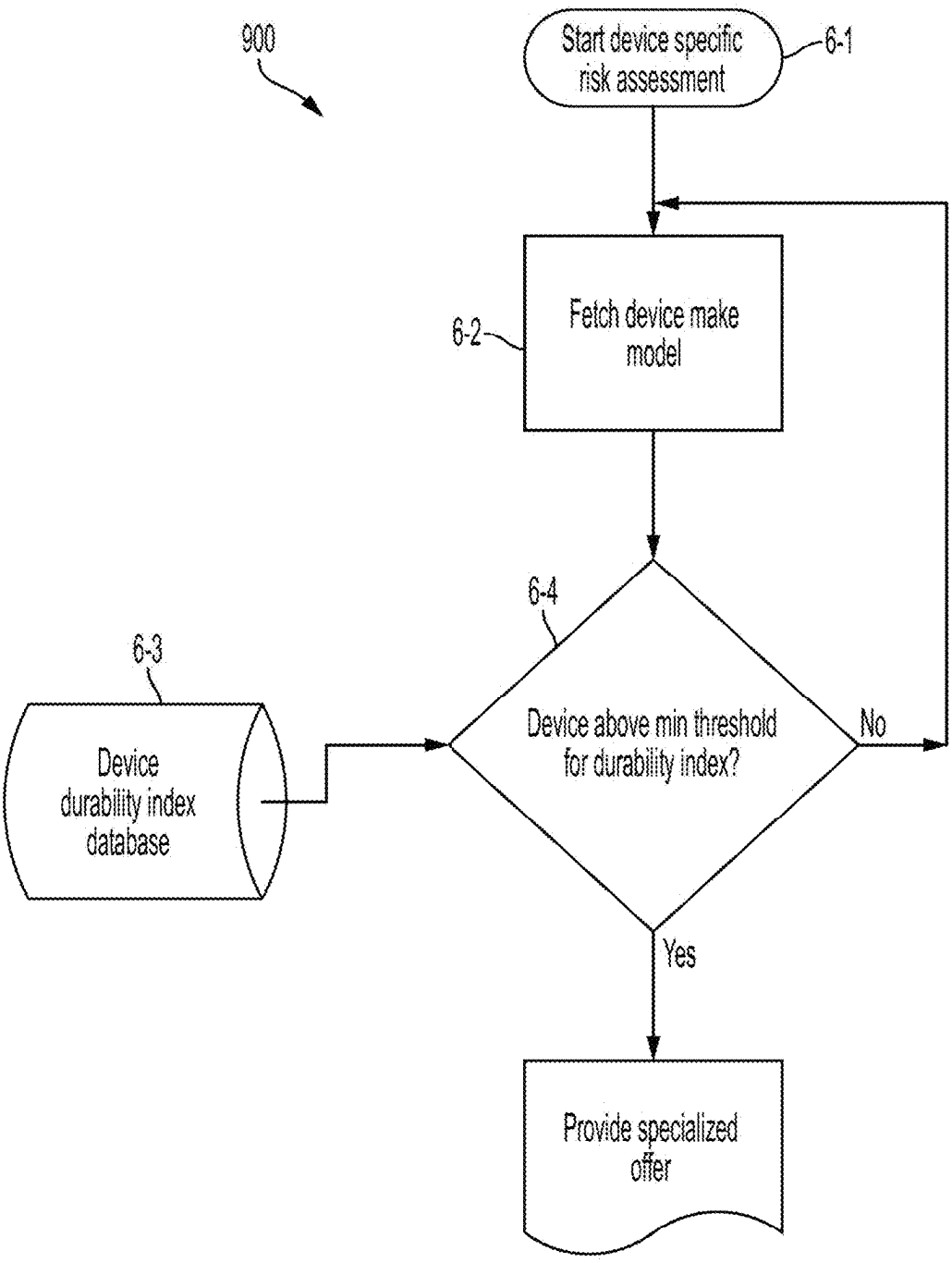

900
Start device specific risk assessment
6-1
Fetch device make model
6-2
6-4
Device above min threshold for durability index?
No
Yes
6-3
Device durability index database
Provide specialized offer

FIG. 9

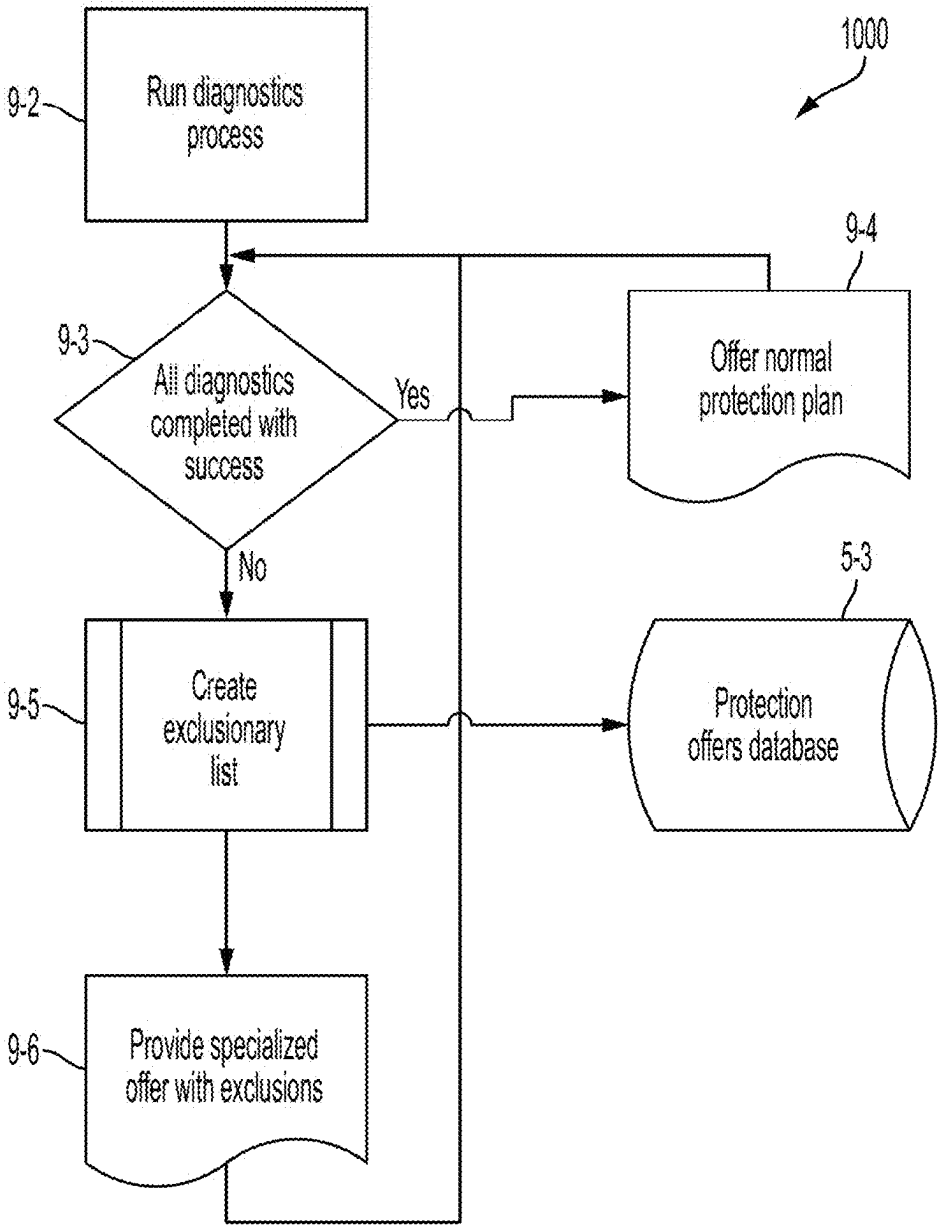

1000
9-2
Run diagnostics process
9-4
9-3
All diagnostics completed with success
Yes
Offer normal protection plan
No
5-3
9-5
Create exclusionary list
Protection offers database
9-6
Provide specialized offer with exclusions

FIG. 10

SYSTEMS AND METHODS FOR GENERATING CONTEXTUALLY RELEVANT DEVICE PROTECTIONS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation of and claims the benefit of U.S. patent application Ser. No. 15/971,550, filed May 4, 2018, the entire contents of which are incorporated by reference herein.

FIELD

[0002] 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

[0003] 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.

[0004] While many consumers commonly purchase insurance or protections 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.

[0005] 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

[0006] FIG. **1** is a block diagram of a system in accordance with disclosed embodiments;

[0007] FIG. **2** is a flow diagram of a method for detecting whether an electronics device has been dropped in accordance with disclosed embodiments;

[0008] FIG. **3** is a graph plotting accelerometer measurements in accordance with disclosed embodiments;

[0009] FIG. **4** is a graph plotting a tendency to drop a device in accordance with disclosed embodiments;

[0010] FIG. **5** is a flow diagram of a method for adjusting risk in accordance with disclosed embodiments;

[0011] FIG. **6** is a flow diagram of a method for adjusting risk and generating warnings in accordance with disclosed embodiments;

[0012] FIG. **7** is a graph plotting device depreciation in accordance with disclosed embodiments;

[0013] FIG. **8** is a flow diagram of a method for accounting for device depreciation in accordance with disclosed embodiments;

[0014] FIG. **9** is a flow diagram of a method for accounting for device durability in accordance with disclosed embodiments; and

[0015] 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

[0016] 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.

[0017] 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.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] 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.

[0022] 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.

[0023] 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.

[0024] 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.

[0025] 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**.

[0026] 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.

[0027] 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**.

[0028] 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**.

[0029] 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**.

[0030] 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.

[0031] 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.

[0032] 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**.

[0033] 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.

[0034] 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: $|A_T|=\text{sqrt}(a_x^2, a_y^2, a_z^3)$. 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.

[0035] 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 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).

[0036] 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.

[0037] 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 ($^{\Theta}X$, $^{\Theta}Y$, $^{\Theta}Z$). 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: $\omega_T=\text{sqrt}(\omega_x^2, \omega_y^2, \omega_z^2)$. 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.

[0038] 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.

[0039] 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.

[0040] 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.

[0041] 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.

[0042] 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**.

[0043] 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.

[0044] 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.

[0045] 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.

[0046] 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.

[0047] 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 moni-

toring 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**.

[0048] 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, as in 10-4, 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, as in 10-4, 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 (see FIG. **5**) on the cloud server, as in 4-5.

[0049] 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.

[0050] 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**.

[0051] 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**.

[0052] 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.

[0053] 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.

[0054] 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:

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

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.

[0055] 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 Jan. 1, 2018 for $1,000 (e.g. release price) and is valued on Dec. 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.

[0056] 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.

[0057] 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.

[0058] 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.

[0059] 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.

[0060] 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.

[0061] 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).

[0062] 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.

[0063] 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.

[0064] 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.

[0065] 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.

1.-20. (canceled)

21. A consumer electronics device comprising:

a housing;

a display device;

at least one sensor;

a memory device; and

at least one processor that is configured to execute self protection operations on the consumer electronics device, the self protection operations comprising:

gathering first data comprising sensor data generated via the at least one sensor of the consumer electronics device;

processing at least a first portion of the sensor data indicative of an acceleration of the consumer electronics device to determine that the acceleration of the consumer electronics device indicates a drop;

processing at least the first portion of the sensor data to determine a geometric mean of rotation based at least in part on the first portion of the sensor data;

determine that the geometric mean of rotation satisfies an impact threshold value; and

in response to the determination that the geometric mean of rotation satisfies the impact threshold value:

(i.) store first information in the memory device associated with the drop, and

(ii.) trigger rendering of a warning on the display device associated with the drop of the consumer electronics device and configured to reduce the likelihood of future drops and/or protect the consumer electronics device in the event of the future drops.

22. The consumer electronics device of claim **21**, wherein the at least one sensor comprises a tri-axial accelerometer, and wherein the self protection operations further comprise:

gathering second data from the tri-axial accelerometer;

parsing the second data to determine whether the second data exceeds a first threshold and subsequently falls below a second threshold within a first time period; and

responsive thereto, saving second information indicating that the consumer electronics device has experienced a drop event, wherein the second information indicates that the drop event corresponds to the consumer electronics device having been dropped.

23. The consumer electronics device of claim **22**, wherein the self protection operations further comprise:

determining that the second data indicates a drop event when the second data falls below a third threshold that is lower than the second threshold or when the second data increases before exceeding the first threshold,

wherein the second information indicates that the drop event corresponds to the consumer electronics device having been thrown.

24. The consumer electronics device of claim **22**, wherein the self protection operations further comprise:

receiving third data from a second sensor of the consumer electronics device;

determining whether the third data exceeds a third threshold; and

in response to the third data exceeding the third threshold, saving third information indicating that the consumer electronics device impacted a hard surface after being dropped.

25. The consumer electronics device of claim **24**, wherein the second sensor is a gyroscope.

26. The consumer electronics device of claim **21**, wherein the self protection operations further comprise:

initiating a display of a notification on the display device that includes a warning associated with the drop of the consumer electronics device; and

gathering second data from a touchscreen of the consumer electronics device, wherein the warning is based at least in part on the second data.

27. The consumer electronics device of claim **21**, wherein the self protection operations further comprise:

initiating a display of a notification on the display device, wherein the notification includes a warning associated with the drop of the consumer electronics device; and

monitoring at least one software application executed via the consumer electronics device to detect at least second data comprising Internet browsing activity, email activity, or user interaction associated with the consumer electronics device via the at least one software application executed via the consumer electronics device, wherein the warning is based at least in part on the second data.

28. The consumer electronics device of claim **21**, wherein the self protection operations further comprise:

gathering second data from the consumer electronics device, wherein the second data indicates a lack of interaction by a user of the consumer electronics device with a second software application associated with the consumer electronics device; and

parsing the second data to determine whether the second data indicates or is associated with a risk and, responsive thereto, (1) save second information indicating that the consumer electronics device has been exposed to the risk and (2) initiate a display of a notification on the display device.

29. The consumer electronics device of claim **21**, wherein the self protection operations further comprise executing an application to continually gather the first data in the background.

30. The consumer electronics device of claim **21**, wherein the self protection operations further comprise processing the at least the first portion of the sensor data indicative of the acceleration of the consumer electronics device to determine that the acceleration of the consumer electronics device indicates the drop by:

processing the first portion of the sensor data to detect that that the first portion of the sensor data, within a first time period initially falls below a lower threshold value, subsequently exceeds an upper threshold value without exceeding an intermediate threshold value below the upper threshold value, and subsequently falls below the lower threshold value.

31. The consumer electronics device of claim **30**, wherein the self protection operations further comprise:

processing a second portion of the sensor data to detect that the second portion of the sensor data initially falls below a threshold value, and subsequently exceeds the intermediate threshold value that is below the upper threshold value; and

in response to detecting that the second portion of the sensor data initially falls below the threshold value and subsequent exceeds the intermediate threshold value, ignoring the second portion of the sensor data as harmless.

32. The consumer electronics device of claim **30**, wherein the self protection operations further comprise automatically setting the first time period based at least in part on a device type associated with the consumer electronics device.

33. The consumer electronics device of claim **30**, wherein the self protection operations further comprise:

automatically detecting a device type associated with the consumer electronics device; and

automatically setting the intermediate threshold value based at least in part on the device type associated with the consumer electronics device.

34. The consumer electronics device of claim **21**, wherein the self protection operations further comprise:

automatically detecting device information associated with the consumer electronics device, the device information comprising a make and/or a model of the consumer electronics device; and

automatically setting the impact threshold value based at least in part on the device information associated with the consumer electronics device.

35. The consumer electronics device of claim **21**, wherein the self protection operations further comprise:

processing at least the first portion of the sensor data to determine an orientation based at least in part on the first portion of the sensor data;

determining that the orientation satisfies the impact threshold value; and

initiating a display of a notification on the display device, wherein the first information is saved and the notification is displayed in response to determining that the orientation satisfies the impact threshold value.

36. The consumer electronics device of claim **21**, wherein the geometric mean of rotation is a speed of rotation.

37. The consumer electronics device of claim **21**, wherein the self protection operations further comprise backing up the consumer electronics device.

38. A computer program product comprising a memory device having a software application stored therein, the software application being configured to, upon execution on at least one processor of an apparatus, direct the apparatus to execute self protection operations comprising:

gathering first data comprising sensor data generated via at least one sensor of the apparatus;

processing at least a first portion of the sensor data indicative of an acceleration of the apparatus to determine that the acceleration of the apparatus indicates a drop;

processing at least the first portion of the sensor data to determine a geometric mean of rotation based at least in part on the first portion of the sensor data;

determining that the geometric mean of rotation satisfies an impact threshold value; and

in response to the determination that the geometric mean of rotation satisfies the impact threshold value:

(i.) storing first information in the memory device associated with the drop, and

(ii.) trigger a warning to be displayed on the apparatus that is associated with the drop of the apparatus and configured to reduce the likelihood of future drops and/or protect the consumer electronics device in the event of the future drops.

39. The computer program product of claim **38**, wherein the self protection operations are further configured to, upon execution:

process the at least the first portion of the sensor data indicative of the acceleration of the apparatus to determine that the acceleration of the apparatus indicates the drop by:

processing the first portion of the sensor data to detect that that the first portion of the sensor data, within a first time period initially falls below a lower threshold value, subsequently exceeds an upper threshold value without exceeding an intermediate threshold value below the upper threshold value, and subsequently falls below the lower threshold value.

40. The computer program product of claim **39**, wherein the self protection operations are further configured to, upon execution:

process a second portion of the sensor data to detect that the second portion of the sensor data initially falls below a threshold value, and subsequently exceeds the intermediate threshold value that is below the upper threshold value; and

in response to detecting that the second portion of the sensor data initially falls below the threshold value and subsequent exceeds the intermediate threshold value, ignore the second portion of the sensor data as harmless.

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