IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

BIG WILL ENTERPRISES INC. **Plaintiff,** **v.** **AWARE360 LTD.** **Defendant.**	**Civil Action File No.: 1:24-cv-00799** **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Big Will Enterprises Inc. ("BWE" or "Plaintiff") in British Columbia, by and through their undersigned attorneys, files this original Complaint against Aware360 Ltd. ("Aware360" or "Defendant") and alleges, based on its own knowledge with respect to itself and its own actions and based on information and belief as to all other matters, as follows:

INTRODUCTION

1.

This is an action for patent infringement arising under the patent laws of the United States, Title 35, United States Code to enjoin infringement and obtain damages from Defendant's unauthorized manufacture, use, sale, offer to sell, and/or importation into the United States for the subsequent use or sale of products or methods that infringe one or more claims of United States Patents: 10,521,846 ("the '846 Patent"); 9,049,558 ("the '558 Patent"); 8,737,951 ("the '951 Patent"); 8,559,914 ("the '914 Patent"); and 8,452,273 ("the '273 Patent"). Copies of the '846 Patent, the '558 Patent, the '951 Patent, the '914 Patent and the '273 Patent are attached as Exhibits 1-5.

2.

BWE is an innovative company in the field of sensor technology for determining human activities for health, safety and other uses. BWE's sensor-based technologies go beyond determining simple human locations and offer smartphone users (and other communication-based devices) a personal surveillance system based on their activities. The technologies monitor sensors such as the accelerometer, the gyroscope and others for uniquely identifying human activities; the motion activities can include, for example, but not limited to, standing/stationary, walking, running, driving, skiing, sleeping, snoring, hiking, skateboarding, sky diving, bicycling, unicycling, golfing, falling down, swimming, riding a ski lift, a motor vehicle, a motorcycle, an airplane, a train, or a water vessel, accelerating or decelerating in a motor vehicle, motorcycle, train, airplane, or water vessel, vibrating, propagating through a medium, rotating, riding in a wheelchair, and other human movements, where capturing data and/or providing feedback is desired. BWE has created proprietary technologies in this field of technology since at least 2007 for, among other benefits, the increased health, safety, and wellbeing of its users. BWE's patented technology was developed for use on a wide variety of devices, including smartphones, smartwatches, and other communication and sensor-based devices in use on many popular products in the market today. In addition to licensing, BWE has incorporated its patented technology in its own test platforms for determining human activities, motions within activities, accidents and falls, among others.

3.

A primary inventive concept is method by which a particular human movement can be identified, when the sensors, in this case, those in a mobile phone, have no fixed orientation with respect to the human. A smart phone may be in a user's pocket, purse or backpack, for example

and in no particular orientation. U.S. 8,452,273 cols. 1-3. Prior to the '273 Patent, there was no effective answer for this problem. BWE's sensor monitoring, processing and communication technology is covered by the claims of the '846, '558, '951, '914, and the '273 Patents asserted in this action, as well as other BWE patents.

JURISDICTION AND VENUE

4.

BWE is a British Columbia company, incorporated in Canada having its principal place of business at 4573 West 1st Avenue, Vancouver, British Columbia V6R 1H7, Canada.

5.

Upon information and belief, Defendant Aware360 Ltd. is a limited liability company organized under the laws of Canada, having its headquarters at 2000 Veterans Place NW, Suite 320, Calgary, Alberta T3B4N2, Canada. Aware360 may be served this Complaint by service in accordance with the Convention of 15 November 1965 on the Service Abroad of Judicial and Extrajudicial Documents in Civil or Commercial Matters ("The Hague Service Convention"). Fed. R. Civ. P. 4(h)(2).

6.

This is an action for infringement of a United States patent arising under 35 U.S.C. §§ 271, 281, and 284-285, among others. This Court has subject matter jurisdiction over all causes of action set forth herein pursuant to 28 U.S.C. §§ 1331 and 1338(a) because this action arises under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq.*

7.

Upon information and belief, Defendant is subject to this Court's specific and general personal jurisdiction pursuant to due process and/or the Texas Long Arm Statute, due at least to Defendant's substantial business in this State and judicial district, including: (i) at least a portion

of the infringements alleged herein; and/or (ii) regularly doing or soliciting business, engaging in other persistent courses of conduct, and/or deriving substantial revenue from goods and services provided to individuals in Texas and in this district.

8.

On information and belief, Defendant's products and services are offered for sale and sold to customers residing in this State and District. Defendants also provide an online presence under the name aware360.com which is available to customers and prospective customers within this State and District. As a result of Defendant's business activities in this State and District, on information and belief, Defendants have had continuous and systematic contacts with this State and District, including sales to customers residing in this State and District.

9.

Venue is proper in this judicial district and division pursuant to 28 U.S.C. §1391(c)(3) in that Defendant is not resident in the United States. Venue is appropriate in this judicial district and division pursuant to 28 U.S.C. §1400(b) in that, upon information and belief, Defendant routinely does business within this district, has committed acts of infringement within this district, and continues to commit acts of infringement within this district.

ALLEGATIONS COMMON TO ALL COUNTS

10.

Plaintiff ("BWE") owns all right, title, interest in, and has standing to sue for infringement the following patents: United States Patent No. 10,521,846, entitled "Targeted advertisement selection for a wireless communication device (WCD)," issued on December 31, 2019; United States Patent No. 9,049,558, entitled "Systems and methods for determining mobile thing motion activity (MTMA) using sensor data of wireless communication device (WCD) and initiating activity-based actions," issued on June 02, 2015; United States Patent No. 8,737,951, entitled

"Interactive personal surveillance and security (IPSS) systems and methods," issued on May 27, 2014; United States Patent No. 8,559,914 entitled "Interactive personal surveillance and security (IPSS) systems and methods," issued on October 15, 2013; and United States Patent No. 8,452,273, entitled "Systems and methods for determining mobile thing motion activity (MTMA) using accelerometer of wireless communication device," issued May 28, 2013.

11.

BWE is a global leader and innovator in the field of sensor technology for determining human activities for health, safety and other uses. These proprietary technologies and innovations were being developed since 2007 for the increased health, safety and wellbeing of its users. BWE patented technology was developed for use on a wide variety of devices, including smartphones and wearables and are in use on many popular products in the market today. In addition to licensing, BWE has incorporated its patented technology in its own test platforms for determining human activities, motions within activities, accidents and falls, among others.

12.

BWE's sensor based technologies go beyond determining human locations by uniquely identifying human activities for automatically monitoring and tracking movements, such as sleep, stationary, walking, running, cycling, falling down, rotating and other human movements where capturing data and/or providing feedback is desired.

13.

BWE's sensor monitoring, processing and communication technologies are covered by the claims of the '846 Patent, '558 Patent, the '951 Patent, the '914 Patent and the '273 Patents which are asserted in this action, as well as other BWE patents.

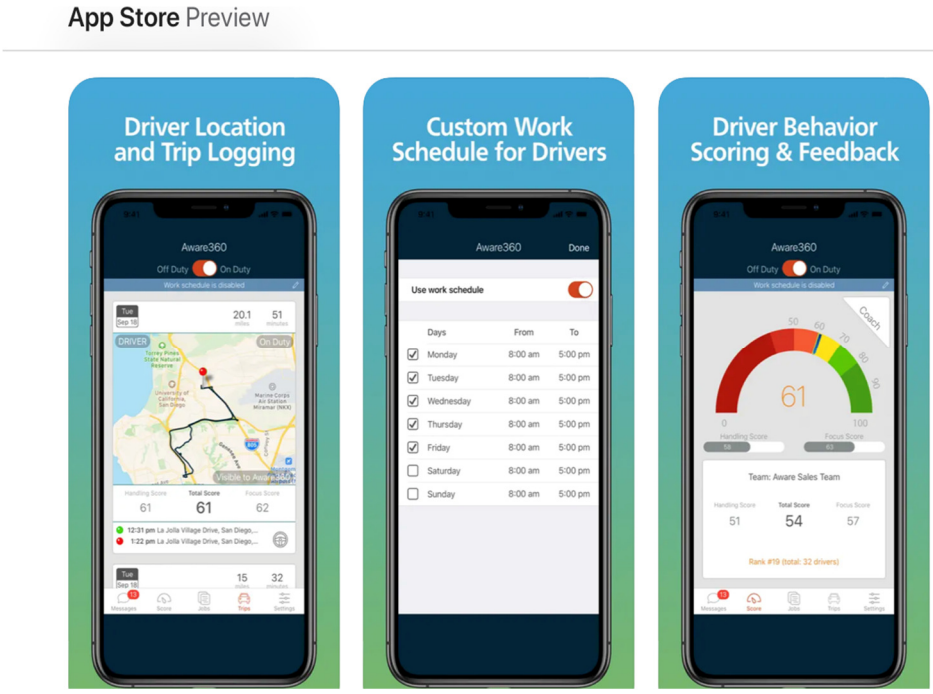
14.

Defendant is a technology company in the business of designing, manufacturing, and supplying on a world-wide basis driver and lone worker safety solutions. In particular, Defendant designed, manufactured, and is using and selling a family of telematics solutions—iDriveAware, SafetyAware, Aware4Duty, and OnSiteAware.

15.

Defendant's iDriveAware application uses wireless communication devices (WCDs), to enhance the driver safety, reduce accidents, and decrease insurance claims. These devices, equipped with memory, processors, and co-processors, play a crucial role in evaluating and reporting multiple facets of driving behavior, including fast accelerations, hard braking and aggressive cornering (steering), accidents and distracted driving. By monitoring accelerometer and gyroscope data, user behaviors while driving can be analyzed, determined and reported:

> Behaviour Definitions:
> PHONE: Measures how much the driver is moving the phone around while driving picking it up or fiddling around with it.
> JERK: Measures harsh or frequent speed changes
> SWERVE: Measures harsh or frequent direction or lane changes
> TURN: Measures the driver's tendency to turn rapidly around curves or turns
> BRAKE: Measures the driver's tendency to brake hard relative to other drivers. See the question below (What is a hard brake?)
> ACCEL: Measures the driver's tendency to accelerate hard relative to other drivers.
> *Speed – measures speeding related to the speed limits and surrounding drivers.
> FOCUS: Measures the driver's reaction time to driving situations by analyzing how much attention the driver is paying while driving. Phone usage, jerking the wheel and swerve also affect this score.
> https://help.aware360.com/en/knowledge-base/idriveaware-faq-for-drivers-and-admins.



https://apps.apple.com/us/app/idriveaware/id1314890719.

"Access real-time movements and location of drivers. Track speeding, braking, cornering, and other unsafe driver behaviors[.]" https://aware360.com/driver-safety/idriveaware.

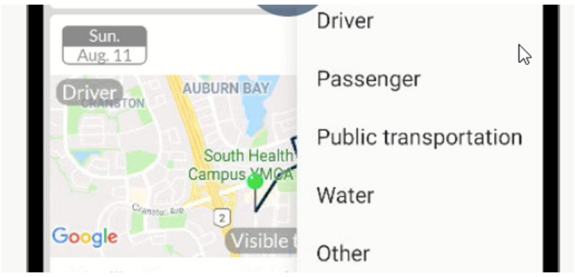
"Fleet Driver Behaviour Monitoring … Monitor driver behaviour such as: speeding, distracted driving, hard turning, tailgaiting, swerving, harsh braking, harsh acceleration[.]" *Id.*

Id.

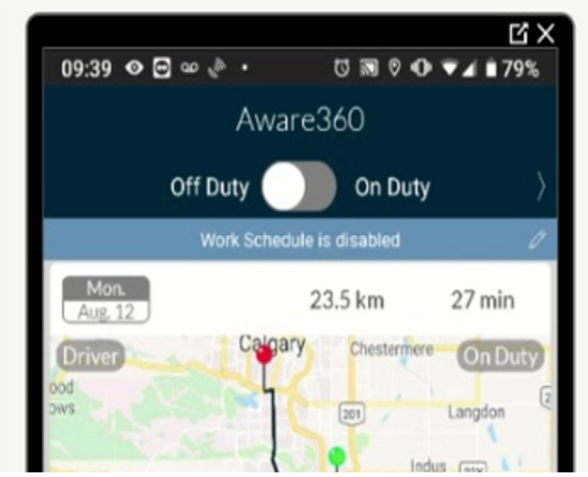
16.

Defendant's iDriveAware application provides for multiple stages of monitoring, such as determination of when a user is in a moving vehicle and whether the user is driving or a passenger, or whether off-duty or on-duty:

> "I wasn't driving. How do I mark myself as a passenger or on public transportation, etc?
>
> If you weren't driving, you can go into the trip after it is completed and mark yourself as passenger or on a bus, etc." https://help.aware360.com/en/knowledge-base/change-mode.



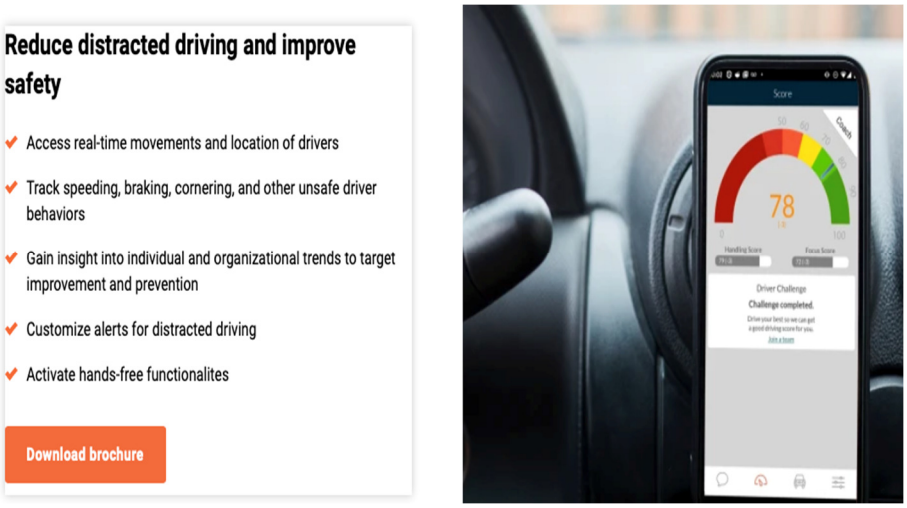
Id.



Id.

17.

Defendant's iDriveAware application provides advertising to the user, such as providing driving scores and coaching to promote safe driving:

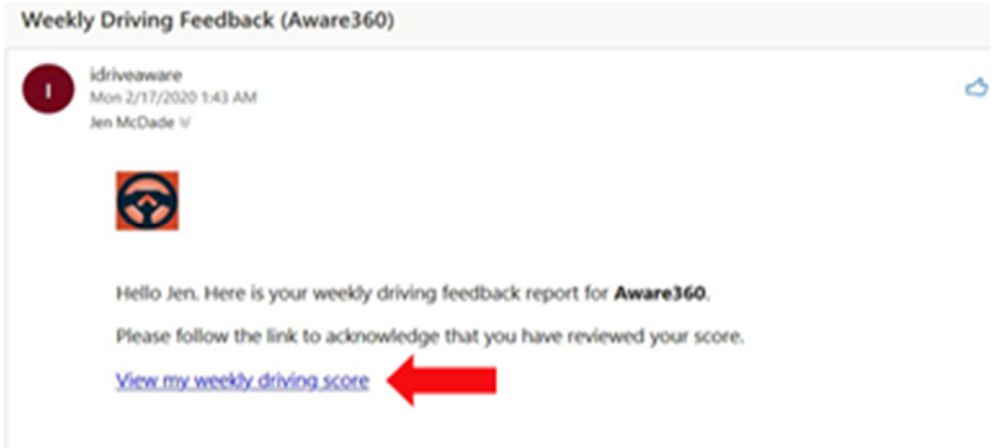


https://aware360.com/driver-safety/idriveaware.

"How is my score evaluated?

To determine driver scores it is important for you to understand each of the scoring behaviours. The score uses a grading system of zero to one hundred (0-100). Zero is the worst score and one hundred being the best. The harsher the behaviour the lower the score."

https://help.aware360.com/en/knowledge-base/idriveaware-faq-for-drivers-and-admins



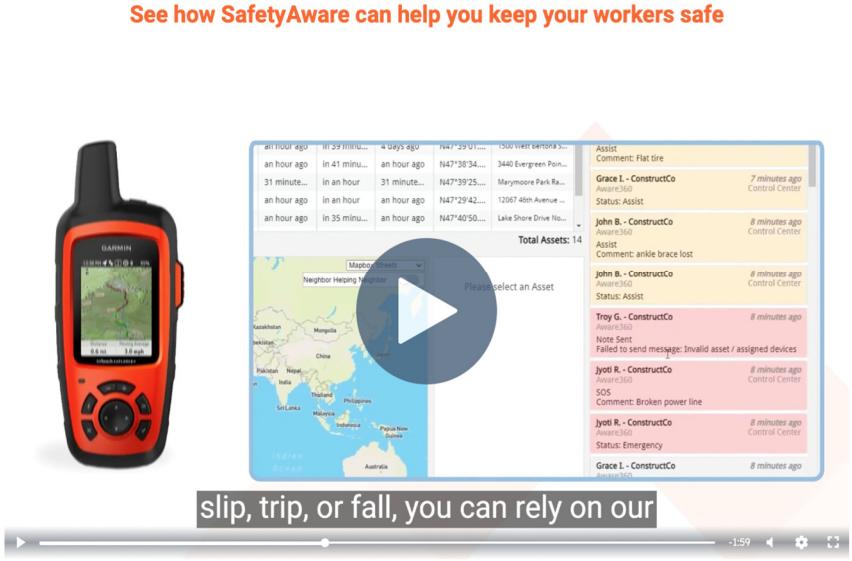
1. By selecting the Coach button, you can review weekly performance metrics to understand key areas that are improving or need improvement
2. You can also review weekly performance in terms of specific driving behaviours through the informational icon ('i' on the right-hand side)

E-Mail: In addition to accessing the interactive driving feedback report in our mobile app, we also e-mail it directly to your drivers.

[https://help.aware360.com/en/knowledge-base/how-to-access-driver-improvement-tools-mobile-web-portal-e-mail.]

18.

Defendant's SafetyAware application employ wireless communication devices (WCDs) transported by the user to effectively determine, monitor, and be used to decreased time for providing safety when falls occur. When a fall is detected, a count-down timer is first engaged, and an alarm state will be activated to contact third party responders unless first canceled by the user.



COUNT I

DIRECT INFRINGEMENT OF THE '846 PATENT

19.

Plaintiff incorporates by reference the allegations of Paragraphs 1-18.

20.

Defendant has directly infringed and continues to directly infringe at least one or more claims of the '846 Patent, through, among other activities, making, using, and incorporating into Defendant's iDriveAware system automatic programs for monitoring human activities while driving. On information and belief, Defendant's iDriveAware system is provided, at least in part, as a smartphone-deployed driver-behavior monitoring and reporting solution.

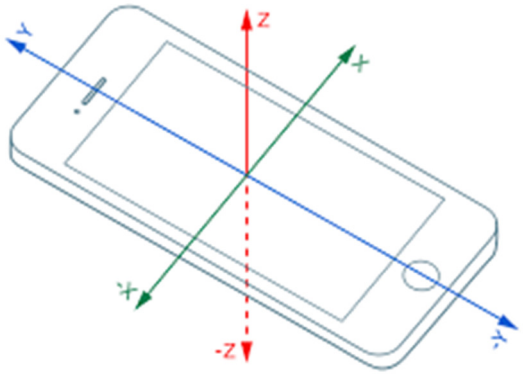
21.

Independent Claim 1 of the '846 Patent, shown in italics, recites:

> *1. A method for use in connection with a wireless communication device (WCD) transported by a mobile thing (MT), the WCD having a computer architecture that has access to a memory, comprising: determining a mobile thing motion activity (MTMA) associated with the MT that is transporting the WCD based at least in part upon sensor data, the sensor data derived from one or more sensors associated with the WCD,*

The iDriveAware system uses smartphones ("wireless communication devices") having accelerometers and gyroscopes for determining human motions and activities. Determination of such human activities may include phone usage or handling while driving as well as determination, aggressive or dangerous driving by detecting fast cornering such as quick sharp turns and others via monitoring acceleration ("accelerometer") sensor data and/or angular velocity ("gyroscope") sensor data over time periods from the internal smartphone sensor(s).

> *the one or more sensors measuring physical movement of the WCD in three dimensional space and producing data sets comprising three movement values and a time value, each of the three movement values indicative of physical movement of the WCD relative to a respective axis in a three dimensional (3D) coordinate system at the time value in order to permit statistical analysis of the physical movement;*



Defendant's iDriveAware system uses smartphones ("wireless communication devices") equipped with accelerometers with 3 or more axis and/or gyroscopes with 3 or more axis sensors for monitoring three dimensional space(s) for representing the driver's movements (such as phone usage while driving, aggressive driving such as cornering and others). The data from the 3 axis accelerometer and/or gyroscope data is measured by using time values for statistical analysis for determining human motions and activities.

> *selecting an advertisement based at least in part upon the determined MTMA; causing the advertisement to be communicated to the WCD; and*

The iDriveAware system monitors driver activities and displays driving statistics including, driver scores, leader boards, and coaching to promote good driving behaviors. These advertisements are part of a complete telematics system to promote better driving, reduce accidents, lower maintenance costs, insurance related costs, and save time.

> *wherein the determining the MTMA comprises: storing a plurality of reference MTMA signatures in the memory, each of the MTMA signatures including frequency and/or time information associated with sensor data pertaining to a specific MTMA;*

The process of comparing the reference data with live accelerometer and/or gyroscope data to reference motion activity creates signatures that include frequencies and/or timing for accurately identifying each activity. The application stores reference data that contains accelerometer and or gyroscope acceleration data that uses frequency and time for accurately identifying each activity (i.e. driving, hard braking, cornering, and accelerations from the device movements (accelerations).

> *determining a normalizing mathematical relationship so that different data sets separated in time can be analyzed in the 3D coordinate system; using the normalizing mathematical relationship, determining normalized data sets; analyzing the normalized data sets in the frequency and time domains;*

The raw accelerometer data contains gravity accelerations that must be normalized (removing the extra data) for accurately measuring the accelerometer's *x*, *y* and *z* axes. Gravity may also be used for determining the 3D coordinate system's *z* axis or vertical (and subsequently horizontal) positions for normalizing the live data into sets of orthogonal data so that the frequency and time domains are measuring vertical and horizontal accelerations separately and accurately. Normalizing the live data into sets of data that may be measured in the frequency and time domains allows the live 3D (3 or more axes from the accelerometer and/or gyroscope) data to be compared to the reference data.

Claim 1 concludes:

> *determining likelihoods associated with the stored MTMA signatures based at least in part upon the analyzing; and selecting a most likely MTMA signature from the plurality of MTMA signatures based at least in part upon the likelihoods.*

Based on a range of live data sets and how accurately these data sets match the motion activity referenced data, the human activity is at least in part determined based on the predetermined likelihoods that are set, the previous identified activity and the possible options within an activity.

22.

Claim 2 of the '846 Patent, for example, recites:

> *2. The method of claim 1, wherein the advertisement is communicated to the WCD via an email or text message.*

The iDriveAware application monitors driver behaviors and uses advertisement notifications and or reward messages so participants are automatically enrolled to receive in-app messages, text messages and or summary emails.

23.

Claim 3 of the '846 Patent, for example, recites:

> *3. The method of claim 1, further comprising determining an identification (ID) of the MT and wherein the selecting the advertisement is further based at least in part upon the determined ID in addition to the determined MTMA.*

On information and belief, Defendant's iDriveAware application receives advertisements promoting rewards for safe driving scores based on the unique ID of the smartphone. This allows the server to message directly to the application user based on updated advertisements.

24.

Claim 4 of the '846 Patent, for example, recites:

> *4. The method of claim 1, further comprising determining a location of the WCD and wherein the selecting the advertisement is further based at least in part upon the location in addition to the determined MTMA.*

On information and belief, Defendant's iDriveAware application monitors driver behavior and determines locations where violations occur (also when drivers finish and or start routes). Notifications and updated screens that show route and location violations, and driver scores are updated and provided to the app user and fleet managers.

25.

Claim 5 of the '846 Patent, for example, recites:

> *5. The method of claim 1, further comprising receiving a payment for or otherwise monetarily benefiting from causing the advertisement to be communicated.*

On information and belief, the iDriveAware application monitors driver behaviors and uses driver scores and gamification awards to change and improve driver behaviors.

26.

Claim 6 of the '846 Patent, for example, recites:

> *6. The method of claim 1, wherein the causing comprises enabling an advertiser to communicate the advertisement to the WCD by advising a remote computer system associated with the advertiser of the MTMA.*

On information and belief, Defendant uses the iDriveAware application to send predefined advertisements from a remote computer system that may be configured from time to time.

27.

Claim 7 of the '846 Patent, for example, recites:

> *7. The method of claim 1, further comprising enabling a user of the WCD to enable and disable the causing of the advertisement.*

On information and belief, Defendant's iDriveAware application allow users to choose if messages will be sent to email or their phone or whether to opt out of receiving messages.

28.

Claim 8 of the '846 Patent, for example, recites:

> *8. The method of claim 1, wherein the sensor data is derived from an accelerometer, a gyroscope, or both.*

As demonstrated, *supra* with respect to Claim 1, Defendant's iDriveAware application uses sensor data from the accelerometer and the gyroscope.

29.

Claim 9 of the '846 Patent, for example, recites:

> *9. The method of claim 1, wherein the steps are performed in the WCD itself or in one or more communicatively coupled computer systems that are remote from the WCD and that receive the sensor data from the WCD.*

On information and belief, Defendant's iDriveAware system and program uses the smartphone applications and sensors and may link to other systems such as dash cams and other sensors and systems to monitor driver behavior from the external sensors and also uses servers to make certain decisions that enhance the accuracy of smartphone data. For example, the driver score is calculated based on at least in part the device sensor data that determines violations such as unsafe driving, hard braking, and rapid acceleration.

30.

Claim 10 of the '846 Patent, for example, recites:

> *10. The method of claim 1, wherein the WCD is communicatively coupled to a remote computer system and wherein the memory is associated with the remote computer system.*

On information and belief, Defendant's iDriveAware system and program uses the smartphone applications and sensors and also uses servers to make certain decisions remotely.

31.

Claim 11 of the '846 Patent, for example, recites:

> *11. The method of claim 1, wherein the memory is local and situated within the WCD.*

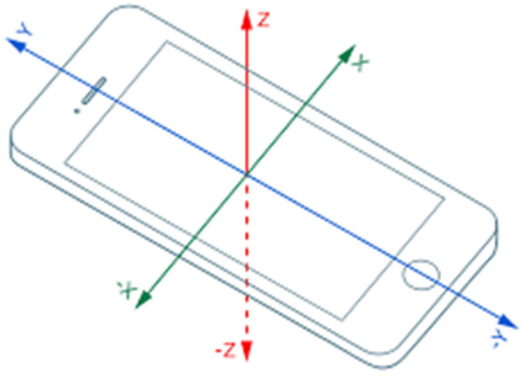
On information and belief, Defendant's iDriveAware application processes and uses memory for certain events and logging of data, that is separate from connecting to servers for storage, computing and memory needs/requirements.

32.

Independent Claim 12 of the '846 Patent, shown in italics, recites:

> *12. A wireless communication device (WCD) transported by a mobile thing (MT), comprising: one or more transceivers designed to enable access to a remote computer system, the remote computer system designed to select a targeted advertisement and enable the advertisement to be communicated or accessed by the WCD;*

Defendant's iDriveAware application run on smartphones ("wireless communication devices") for determining human motions and activities. The smartphones equipped with the iDriveAware application uses transceivers designed to send and receive from remotely located servers. The iDriveAware system monitors driver activities and displays driving statistics including, driver scores, leader boards, and coaching to promote good driving behaviors. These advertisements are part of a complete telematics system to promote better driving, reduce accidents, lower maintenance costs, insurance related costs, and save time.



The iDriveAware application uses accelerometers with three or more axis sensors and/or gyroscopes with three or more axis sensors for monitoring three dimensional space(s) for representing the driver's movements (such as phone usage while driving, aggressive driving such

as cornering and others). The data from the three-axis accelerometer and/or gyroscope data is measured by using time values for statistical analysis for determining human motions and activities.

> *one or more memories designed to store computer program code; and one or more processors designed to execute the computer program code, the computer program code comprising: code designed to determine mobile thing motion activity (MTMA) of the MT that is transporting the WCD based at least in part upon the sensor data and the statistical analysis of the physical movement of the WCD;*

The iDriveAware application uses smartphone memory to store the program code and use the smartphone processor(s) to execute the program code. The application code determines the motion activity for determining at least in part (user driving, using phone for text messaging, aggressively cornering and others) through the use of the sensor data and the statistical analysis of the movement of the smartphone.

> *code designed to communicate the sensor data or a mobile thing motion activity (MTMA) of the MT that is transporting the WCD and that is derived from the sensor data via the one or more transceivers to the remote computer system in order to enable selection of the targeted advertisement that is suited for the determined MTMA; code designed to receive and locally communicate the advertisement to a user interface of the WCD; and*

The iDriveAware application code is designed to communicate sensor data or the identified motion activity (user driving, using phone for text messaging, aggressively cornering and others) to the server that processes the driver updates into scores, awards, leaderboards and notifications that are used in the advertisements sent to driver. The code communicates the score, awards, and notifications to the smartphone display.

> *wherein the code designed to determine the MTMA comprises: code designed to store a plurality of reference MTMA signatures in the memory, each of the MTMA signatures including frequency and/or time information associated with sensor data pertaining to a specific MTMA; code designed to determine a normalizing mathematical relationship so that different data sets separated in time can be analyzed in the 3D coordinate system;*

The iDriveAware application code normalizes the live data into sets of data that may be measured in the frequency and time domains and allows the live 3D (three or more axes from the accelerometer and/or gyroscope) data to be compared to the reference data. Code is used to determine time separations so the raw data so it may be analyzed in a 3D coordinate system.

> *code designed to, using the normalizing mathematical relationship, determine normalized data sets; code designed to analyze the normalized data sets in the frequency and time domains; code designed to determine likelihoods associated with the stored MTMA signatures based at least in part upon the analyzing; and code designed to select a most likely MTMA signature from the plurality of MTMA signatures based at least in part upon the likelihoods.*

The iDriveAware application code is used to match timed data and analyze the normalized data sets in the frequency and time domains. The code determines the likelihoods of the stored reference data and selects the most likely motion activity from a plurality of reference data (signatures) based on such likelihoods.

33.

Claim 13 of the ’846 Patent, for example, recites:

> *13. The WCD of claim 12, wherein the program code further comprises code to determine an identification (ID) associated with the MT and wherein the code to select the advertisement makes the selection based at least in part upon the determined ID of the user.*

Defendant’s iDriveAware system monitors individual driver behaviors, and provides scoring, coaching, and details to each driver. The system also uses a smartphone unique identifier to connect and send messages from the server to a driver’s application.

34.

Claim 14 of the ’846 Patent, for example, recites:

> *14. The WCD of claim 12, wherein the program code further comprises code to determine a location of the WCD and wherein the code to select the advertisement makes the selection based at least in part upon the location.*

On information and belief, Defendant's iDriveAware application determines a user's location via the smartphone and provides advertisements to the user when the user engages unsafe driving, finishes an activity (end of route), or when the user starts a new route.

35.

Claim 15 of the '846 Patent, for example, recites:

> *15. The WCD of claim 12, wherein the sensor data is derived from an accelerometer, a gyroscope, or both.*

As demonstrated, *supra* with respect to Claim 1, Defendant's iDriveAware application uses sensor data from the accelerometer and the gyroscope.

36.

Claim 16 of the '846 Patent, for example, recites:

> *16. The system of claim 12, wherein the computer program code further comprises: code to determine a mathematical relationship between different data sets to enable analysis of the different data sets in the 3D coordinate system; and code to determine the MTMA based at least in part upon the analysis of the different data sets in the 3D coordinate system.*

The iDriveAware application uses code to determine a mathematical relationship between different data sets from the accelerometer and/or gyroscope in the 3D coordinate system.

COUNT II

DIRECT INFRINGEMENT OF THE '558 PATENT

37.

Plaintiff incorporates by reference the allegations of Paragraphs 1-18.

38.

Defendant has directly infringed and continues to directly infringe at least one or more claims of the '558 Patent, through, among other activities, making, using, and incorporating into Defendant's iDriveAware system automatic programs for monitoring human activities while

driving. On information and belief, Defendant's iDriveAware system is provided, at least in part, as a smartphone-deployed driver-behavior monitoring and reporting solution.

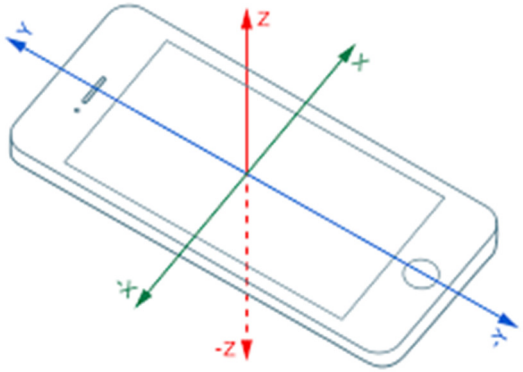
39.

Independent Claim 1 of the '558 Patent, shown in italics, recites:

> *1. A method, comprising: receiving a time value and at least three streams of data sample values from one or more sensors of a wireless communication device (WCD) that is transported by a mobile thing (MT), each data sample value indicative of movement of the WCD at a corresponding time value;*

The iDriveAware application uses wireless communication devices for determining human activities including driving vehicles, riding in vehicles while not driving, aggressively driving, distractedly driving, and others, by monitoring linear acceleration and angular velocity sensor data over time periods from the internal accelerometer sensor and/or gyroscope sensor. In particular, the iDriveAware application uses native applications running on top of the operating systems of smartphones that are equipped with an accelerometer and gyroscope sensors for monitoring three streams of data ("the *x*, *y*, and *z* axis") from each device. The iDriveAware application monitors the accelerometer sensor for linear acceleration and the gyroscope sensor for angular velocity to determine human activities (from sensor data), when users are not in vehicles, driving vehicles, riding in vehicles, when users drive aggressively/dangerously by making sharp/fast turns, use hard braking, accelerate fast, and when they handle and/or use smartphones while driving. Accelerometers are sensors which measure acceleration, the change in velocity over time (SI unit: m/s^2). The iDriveAware application code measures acceleration of the user and driver in time-segments, using first, second, et cetera, to confirm multiple time-segment matches to confirm most human activities.

> *recognizing a particular set of data sample values as a reference for defining an orientation of the WCD in a coordinate system;*



The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis data to measure linear acceleration and/or the gyroscope *x*, *y*, and *z* axis data, delivered in a structured data-object format, to measure angular velocity to sense and determine the orientation so that driving may be accurately measured. Defining the orientation determines a reference and orientation allow and/or to increase the accuracy of identifying a Motion Activity (MT). Defining the ongoing stream of data representing forward momentum and/or gravity the data is measured and used for determining orientation in the coordinate system. In other words, the iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis to detect the linear acceleration of gravity for determining the orientation of the three dimensional (3D) coordinate system (accelerometer) so it may accurately measure human activities.

> *computing reference data based upon the recognition of the particular set, the reference data defining a relationship between each set of subsequent non-reference data sample values and the particular reference set of data sample values in the coordinate system;*

Defendant's iDriveAware application computes reference data and particular sets of non-reference data. Each segment of reference data represents acceleration in an *x*, *y* or *z* axis over a period of time. In particular, the iDriveAware application computes reference data with data sets coming from knowing at least one orientation identified through the acceleration that comes from earth's gravity and the other accelerations that are determined by the user's activity are measured by the

accelerometers *x*, *y* or *z* axis. The iDriveAware application determines when a user is aggressively driving, for example sharp cornering by measuring sharp cornering reference data to horizontal acceleration in multiple data sets coming from the *x*, *y*, and *z* axis of the accelerometer when a user is driving.

> *calculating movement data in the coordinate system of one or more other non-reference data sample values based upon the reference data; and*

The iDriveAware application swiftly computes real-time movement accelerations across the *x*, *y*, and *z* axes of accelerometer and or gyroscope data. These computations are executed within concise time periods, forming dynamic data blocks that provide critical insights into unsafe driver events.

> *determining a mobile thing motion activity (MTMA) associated with the MT based upon the movement data.*

By comparing the iDriveAware application reference data with the accelerometer data, and optionally GPS data, safe/unsafe styles of driving (e.g., hard braking or fast acceleration) are determined from the movement data.

40.

Claim 2 of the '558 Patent, for example, recites:

> *2. The method of claim 1, further comprising: prior to recognizing, mathematically combining the data sample values of the particular reference set; and recognizing the particular reference set as the reference when a combined value has a magnitude that is indicative of a relationship to Earth gravity.*

Defendant's iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. Because smartphone movements are dynamic, *i.e.*, the phone's orientation is not static and therefore an unknown variable, the iDriveAware application monitors the direction of the Earth's gravity to establish the current

orientation of the device by totaling the three accelerometer axis (x, *y* and *z*) data over short time periods that is equal to the Earth's gravity (9.807 m/s^2).

41.

Claim 3 of the '558 Patent, for example, recites:

> *3. The method of claim 2, further comprising updating the reference data each time the reference set of data samples is recognized.*

On information and belief, the iDriveAware application uses short time periods between 1 and 200ths of a second to recalculate the direction of the Earth's gravity ("9.807"). This provides an updated orientation of the smartphone device (multiple times per second).

42.

Claim 4 of the '558 Patent, for example, recites:

> *4. The method of claim 1, wherein: each set of data sample values includes a vector defined by three data sample values x, y, z; the reference data is a rotation matrix M; and the movement data comprises a vertical magnitude along the z axis and a horizontal magnitude along the x, y plane, both derived from a rotated vector, the rotated vector equal to the rotation matrix M multiplied by the vector associated with the other non-reference data sample values x, y, z.*

The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. After the direction of the Earth's gravity (9.807 m/s^2) is determined, for example, the iDriveAware application first determines the vertical direction, then a second horizontal direction is determined by rotating the vector for measuring forward/backwards acceleration/braking and fast cornering types of vehicle movements through acceleration on a horizontal plane. This method is also used for determining when a user is handling or using their smartphone while driving.

43.

Claim 5 of the '558 Patent, for example, recites:

> *5. The method of claim 4, further comprising: transforming the movement data to the frequency domain (FD) to produce FD data; computing one or more FD statistical metrics from the FD data; and wherein the MTMA identifying is based at least in part upon the FD statistical metrics.*

On information and belief, the iDriveAware application processes the smartphone's accelerometer *x*, *y* and *z* axis data in a frequency domain (FD) to determine at least part of the motion activity. The iDriveAware application uses Fast Fourier Transform (FFT) to convert the users smartphone accelerometer data to frequency domain from time domain. The frequency domain provides enhanced measurements of *x*, *y* and *z* axis data, including the band power of the signal, the energy (summation of the squared FFT parameters - coefficients), and the magnitude. The iDriveAware application determines the motion activity, at least in part by the mean, maximum and minimum values of accelerometer's *x*, *y* and *z* axis that come from the smartphone's movements.

44.

Claim 6 of the '558 Patent, for example, recites:

> *6. The method of claim 5, wherein the MTMA is identified from a set of MTMAs and further comprising: computing a score for each MTMA of the set; and comparing the scores to identify the MTMA.*

On information and belief, the iDriveAware application uses a list of motion activities such as driving, riding, fast acceleration or hard braking when driving, fast/sharp cornering, and when the user is holding and making calls with their phone.

45.

Claim 7 of the '558 Patent, for example, recites:

> *7. The system of claim 5, wherein the MTMA is identified from a set of MTMAs and wherein the computer program code further comprises: code to compute a score for each MTMA of the set; and code to compare the scores to identify the MTMA.*

On information and belief, the iDriveAware application uses a list of motion activities such as driving, riding, fast acceleration or hard braking when driving, fast/sharp cornering, and when the

user is holding and making calls with their phone. Each data set, such as sharp cornering provides an acceleration level (*i.e.,* score) and will be used in determining when a violation/negative event occurs for the driver.

46.

Claim 8 of the '558 Patent, for example, recites:

> *8. The method of claim 1, wherein the MTMA is identified from a set of MTMAs and further comprising: computing a score for each MTMA of the set; and comparing the scores to identify the MTMA*

On information and belief, the iDriveAware application uses a list of motion activities such as driving, riding, fast acceleration or hard braking when driving, fast/sharp cornering, and when the user is holding and making calls with their phone. Each data set, such as sharp cornering provides an acceleration level (i.e. score) and will be used in determining when a violation/negative event occurs for the driver.

47.

Claim 9 of the '558 Patent, for example, recites:

> *9. The method of claim 1, wherein the reference data is in the form of a rotation matrix that normalizes the sets of non-reference data sample values with respect to Earth gravity.*

On information and belief, the iDriveAware application determines driving behaviors such as sharp cornering, fast acceleration, and hard braking by determining and measuring a horizontal motion through a rotation matrix to Earth's gravity.

48.

Claim 10 of the '558 Patent, for example, recites:

> *10. The method of claim 1, wherein the movement data is in the time domain (TD) and wherein the computing comprises: computing a magnitude of the movement data in each of the two dimensions of space; computing one or more TD statistical metrics from the magnitudes; and wherein the MTMA determining is based at least in part upon the TD statistical metrics.*

The iDriveAware application measures acceleration by magnitude and time to determine motion activities such as driving, riding, fast acceleration or hard braking when driving, fast/sharp cornering, and when the user is holding and making calls with their phone.

49.

Claim 11 of the '558 Patent, for example, recites:

> *11. The method of claim 10, further comprising: transforming the magnitudes from the TD to the frequency domain (FD) to produce FD data; computing one or more FD statistical metrics from the FD data; and wherein the MTMA determining is based at least in part the FD statistical metrics.*

On information and belief, the iDriveAware application processes the smartphone's accelerometer *x*, *y* and *z* axis data in a frequency domain (FD) to determine at least part of the motion activity. The iDriveAware application uses Fast Fourier Transform to convert the users smartphone accelerometer data to frequency domain from time domain. The frequency domain provides enhanced measurements of *x*, *y* and *z* axis data, including the band power of the signal, the energy (summation of the squared FFT parameters - coefficients), and the magnitude. The iDriveAware application determines the motion activity, at least in part by the mean, maximum and minimum values of accelerometer's *x*, *y* and *z* axis that come from the smartphone's movements.

50.

Claim 12 of the '558 Patent, for example, recites:

> *12. The system of claim 10, wherein the computer program code further comprises: code to transform the magnitudes from the TD to the frequency domain (FD) to produce FD data; code to compute one or more FD statistical metrics from the FD data; and wherein the MTMA determining is based at least in part the FD statistical metrics.*

On information and belief, the iDriveAware application measures acceleration by magnitude and time to determine motion activities such as driving, riding, fast acceleration or hard braking when driving, fast/sharp cornering, and when the user is holding and making calls with their phone. The

frequency domain (FD) may be updated by analysis over time and used to determine the motion activity.

51.

Claim 13 of the '558 Patent, for example, recites:

> *13. The method of claim 1, wherein one or more of the steps of the method is implemented in the WCD, in a computer system that is remote to the WCD, or in a combination of both.*

On information and belief, the iDriveAware system may use servers and other remote computers to implement one or more of the steps to measure, determine and/or rate the acceleration to determine motion activities.

52.

Claim 14 of the '558 Patent, for example, recites:

> *14. The system of claim 1, wherein the MTMA is identified from a set of MTMAs and wherein the computer program code further comprises: code to compute a score for each MTMA of the set; and code to compare the scores to identify the MTMA.*

On information and belief, the iDriveAware application identifies a motion activity (normal driving and dangerous driving, such as sharp cornering, phone usage and others) by computing a score related to an activity match, and when close, the activity is determined.

53.

Claim 15 of the '558 Patent, for example, recites:

> *15. The system of claim 1, wherein the reference data is in the form of a rotation matrix that normalizes the sets of non-reference data sample values with respect to Earth gravity.*

The iDriveAware application determines driving behaviors such as sharp cornering, fast acceleration, and hard braking by determining and measuring a horizontal motion through normalizing the data in a directional analysis to Earth's gravity.

54.

Claim 16 of the '558 Patent, for example, recites:

> *16. The system of claim 1, wherein the system is implemented in the WCD, in a computer system that is remote to the WCD, or in a combination of both.*

On information and belief, Defendant's iDriveAware system may use servers and other remote computers to implement one or more of the steps to measure, determine and/or rate the acceleration to determine motion activities.

55.

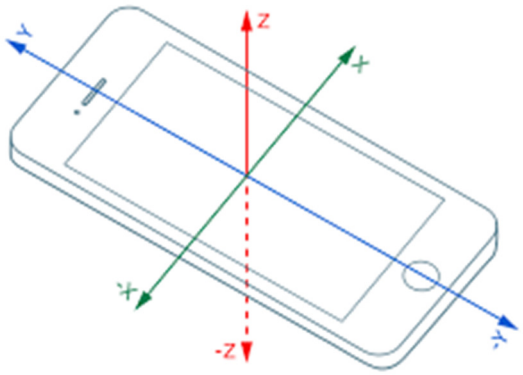
Independent Claim 17 of the '558 Patent, shown in italics, recites:

> *17. A method, comprising: receiving first and second data from one or more sensors associated with a wireless communication device (WCD) transported by a mobile thing (MT), the first and second data indicative of movement of the WCD;*

Defendant's iDriveAware application uses wireless communication devices for determining human activities including when users are driving vehicles, riding in vehicles (not driving), when users are aggressively driving, when they are using of smartphones and distracted while driving, and others by monitoring linear acceleration and angular velocity sensor data over time periods from the internal accelerometer sensor and/or gyroscope sensor. In particular, the iDriveAware application programs use smartphones equipped with an accelerometer and gyroscope sensors for monitoring three streams of data ("the *x*, *y*, and *z* axis") from each device. The iDriveAware application software monitors the accelerometer sensor for linear acceleration and the gyroscope sensor for angular velocity to determine human activities. Accelerometers are sensors which measure acceleration, the change in velocity of an object over time (SI unit: m/s^2). The iDriveAware application measures acceleration of the user and driver in time-segments, using first, second, et cetera, to confirm multiple time-segment matches to confirm most human activities.

Claim 17 continues:

> *determining reference data that defines a reference framework from the first data;*



The iDriveAware application uses a wide range of accelerometer data sample values. These updates are delivered in structured data-object formats, which contains detailed information about the device's accelerations, including gravity ($g \approx 9.81$ m/s²).

> *normalizing the second data with the reference data so that the second data can be analyzed in the reference framework; and*

To ensure accurate comparisons with reference data, the live data from the accelerometer undergoes normalization, effectively neutralizing the influences of gravity. This crucial step enables precise data analysis and evaluation.

> *identifying a mobile thing motion activity (MTMA) associated with the MT based upon the normalized second data.*

By comparing the reference data with the live accelerometer and gyroscope data that excludes gravity data, the iDriveAware application can accurately determine potentially critical events such as rapid accelerations, hard braking and distracted driving.

56.

Claim 18 of the '558 Patent, for example, recites:

> *18. The method of claim 17, wherein the second data comprises a plurality of periodic samples.*

On information and belief, Defendant's iDriveAware application uses different sample rates based on the activity, such as determining if a user is walking or driving a car. If a person is not driving, periodic samples are used to reduce sensor and battery usage (GPS is not turned on until the user is driving).

57.

Claim 19 of the '558 Patent, for example, recites:

> *19. The method of claim 17, wherein the reference data is indicative of a relationship to Earth gravity.*

The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. Smartphone movements are dynamic, therefore the iDriveAware application monitors the direction of the Earth's gravity to establish an orientation of the device by totaling the accelerometer axis data over short time periods that is equal to the Earth's gravity (9.807 m/s^2).

58.

Claim 20 of the '558 Patent, for example, recites:

> *20. The method of claim 17, wherein the reference data is determined in the form of vector information indicative of a relation to Earth gravity by comparing the first data to a predefined numerical range.*

The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. Because smartphone movements are dynamic and the phone's orientation is not a given variable, the iDriveAware application monitors the direction of the Earth's gravity to establish an orientation of the device by totaling the accelerometer axis data over short time periods that is equal to the Earth's gravity (9.807 m/s^2).

59.

Claim 21 of the '558 Patent, for example, recites:

> *21. The method of claim 20, wherein the one or more sensors produce first, second, and third sample data along each of 3 axes in a three dimensional (3D) coordinate system and wherein the first data pertains to a value that equals one within a predefined range, the value computed by combining the first, second, and third sample data.*

The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis data to measure linear acceleration and/or the gyroscope *x*, *y*, and *z* axis data to measure angular velocity to sense data over multiple samples to accurately identify the motion activity.

60.

Claim 22 of the '558 Patent, for example, recites:

> *22. The method of claim 17, wherein the second data is in the time domain (TD) and wherein the identifying comprises: computing magnitudes of the second data in each of the two dimensions of the 2D space; computing one or more TD statistical metrics from the magnitudes; and wherein the MTMA identifying is based at least in part upon the TD statistical metrics.*

On information and belief, the iDriveAware application identifies a motion activity (normal driving and dangerous driving, such as sharp cornering, phone usage and others) by monitoring and computing the magnitudes of the data in a two dimension time domain. The iDriveAware application uses Fast Fourier Transform to convert the users smartphone accelerometer data to frequency domain from time domain. The frequency domain provides enhanced measurements of *x*, *y* and *z* axis data, including the band power of the signal, the energy (summation of the squared FFT parameters - coefficients), and the magnitude. The iDriveAware application determines the motion activity, at least in part by the mean, maximum and minimum values of accelerometer's *x*, *y* and *z* axis that come from the smartphone's movements.

61.

Claim 23 of the '558 Patent, for example, recites:

> *23. The method of claim 22, further comprising: transforming the magnitudes from the TD to the frequency domain (FD) to produce FD data; computing one or more FD statistical metrics from the FD data; and*

> *wherein the MTMA identifying is based at least in part the FD statistical metrics.*

On information and belief, Defendant's iDriveAware application measures acceleration by magnitude and time to determine motion activities such as driving, riding, fast acceleration or hard braking when driving, fast/sharp cornering, and when the user is holding and making calls with their phone. The frequency domain (FD) may be updated by analysis from the time domain (TD) and used to determine the motion activity. On information and belief, the iDriveAware application uses statistical metrics that is collected over time, to update motion activity data for matching.

62.

Claim 24 of the '558 Patent, for example, recites:

> *24. The method of claim 23, wherein the MTMA is identified from a known plurality of MTMAs and further comprising: computing a score for each MTMA of the known plurality; and comparing the scores to identify the MTMA.*

On information and belief, Defendant's iDriveAware system identifies a motion activity (normal driving and dangerous driving, such as sharp cornering, phone usage and others) by computing a score related to an activity match, and when close the activity is determined.

63.

Claim 25 of the '558 Patent, for example, recites:

> *25. The method of claim 17, wherein one or more of the steps of the method is implemented in the WCD, in a computer system that is remote to the WCD, or in a combination of both.*

On information and belief, Defendant's iDriveAware system may use servers and other remote computers to implement one or more of the steps to measure, determine and/or rate the acceleration to determine motion activities.

64.

Claim 26 of the '558 Patent, for example, recites:

> *26. The method of claim 17, further comprising: determining an MTMA based action to be initiated based upon the identified MTMA; and initiating the MTMA based action.*

On information and belief, the iDri veAware application determines when a user is walking, then determines when the user is driving to activate and monitor GPS and other types of monitoring processes based on the motion activity.

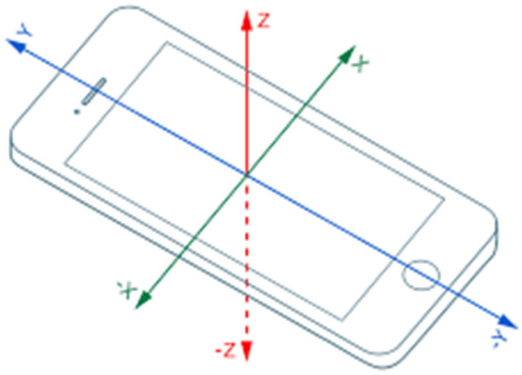
65.

Independent Claim 27 of the ’558 Patent, shown in italics, recites:

> *27. A method for implementation in a wireless communication device (WCD) that is designed to detect a plurality of mobile thing motion activities (MTMAs) associated with a mobile thing (MT), comprising:*

Defendant’s iDriveAware system uses wireless communication devices for determining human activities including driving vehicles, riding in vehicles and not driving, when users are aggressively driving, when they are using of smartphones and distracted while driving, and others by monitoring linear acceleration and angular velocity sensor data over time periods from the internal accelerometer sensor and/or gyroscope sensor. These devices provide three streams of data (*x*, *y*, and *z* axes) from the accelerometer and or gyroscope to accurately track movements and times, allowing it to efficiently determine and assess driving behaviors.

> *receiving a plurality of data sample values from one or more sensors of the WCD that is transported by the MT, the data sample values indicative of movement of the WCD;*



The iDriveAware application collects and processes accelerometer sensor data from three-axis accelerometers and three-axis gyroscopes to accurately identify user events/activities such as hard braking, accelerations, cornering and distracted driving. This advanced technology continuously monitors the device movement via the accelerometer and gyroscope sensors.

> *computing reference data, the reference data defining a relationship between data sample values and a reference framework to enable comparison of data sample values; calculating movement data based upon the reference data and the data sample values; and*

The iDriveAware application collects a wide range of accelerometer data sample values. These updates are delivered in a structured data-object format, which contains detailed information about the device's accelerations, including gravity ($g \approx 9.81\ m/s^2$). The iDriveAware application computes reference data within a framework (values, size, time, peaks, frequencies, filtering out dominant frequencies, et cetera) with accelerometer data samples that come from wireless communication device.

> *determining an MTMA associated with the MT based upon the movement data.*

By comparing the iDriveAware application reference data with the accelerometer data, users driving and safe/unsafe styles of driving (hard braking/fast acceleration) may be determined from the movement data.

66.

Claim 28 of the 558 Patent, for example, recites:

> *28. The method of claim 27, further comprising: recognizing a particular set of data sample values as a reference for defining an orientation of the WCD in a coordinate system; determining a rotation matrix based upon the particular set of reference data sample values; and calculating the movement data based upon the rotation matrix and one or more sets of the data sample values that are not the particular reference set.*

The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. After the direction of the Earth's gravity is determined, for example, the iDriveAware application first determines the vertical direction, then a second horizontal direction is determined by rotating the vector for measuring forward/backwards and fast cornering types of vehicle movements through acceleration on a horizontal plane. The same method also used for determining when the user is handling or using their smartphone while driving.

67.

Claim 29 of the '558 Patent, for example, recites:

> *29. The method of claim 27, wherein the data sample values are received from a plurality of the sensors.*

The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis and the gyroscope *x*, *y*, and *z* axis, magnatometer, touch screen, and/or GPS data samples for determining at least part of the motion activities.

68.

Claim 30 of the '558 Patent, for example, recites:

> *30. The method of claim 29, wherein the plurality of sensors includes at least an accelerometer and a gyroscope.*

The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axes and/or the gyroscope *x*, *y*, and *z* axes for determining at least part of the motion activities.

69.

Claim 31 of the '558 Patent, for example, recites:

> *31. The method of claim 30, wherein the plurality of sensors further includes a global positioning system (GPS) receiver.*

The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axes, the gyroscope *x*, *y*, and *z* axes and/or the global positioning system (GPS) receiver for determining at least part of the motion activities.

70.

Claim 32 of the '558 Patent, for example, recites:

> *32. The method of claim 27, wherein the MTMA is determined by: computing a score for each MTMA of the plurality; and comparing the scores to identify the MTMA.*

On information and belief, Defendant's iDriveAware application uses a score that matches different motion activities. The score includes at least the frequency domain and/or the time domain for multiple data samples.

71.

Claim 33 of the '558 Patent, for example, recites:

> *33. The method of claim 27, wherein the reference data is indicative of a relationship to Earth gravity.*

The iDriveAware application uses reference data to match sensor data that corresponds to Earth's gravity.

72.

Claim 34 of the '558 Patent, for example, recites:

> *34. The method of claim 27, wherein the movement data is in the time domain (TD) and wherein the calculating comprises: computing a magnitude of the movement data in each of at least two dimensions of space; computing one or more TD statistical metrics from the magnitudes; and wherein the MTMA determining is based at least in part upon the TD statistical metrics.*

On information and belief, the iDriveAware application processes the smartphone's accelerometer *x*, *y* and *z* axis data in a frequency domain (FD) to determine at least part of the motion activity. The iDriveAware application uses the frequency domain to determine the maximum and minimum

values of accelerometer's *x*, *y* and *z* axis in a two dimensional space so a time domain may enhance types of motion activities from the smartphone's movements.

73.

Claim 35 of the '558 Patent, for example, recites:

> *35. The method of claim 34, further comprising: transforming the magnitudes from the TD to the frequency domain (FD) to produce FD data; computing one or more FD statistical metrics from the FD data; and wherein the MTMA determining is based at least in part the FD statistical metrics.*

On information and belief, the iDriveAware application further transforms the magnitudes from the time domain to the frequency domain to form frequency domain data. Statistical metrics at least in part determine the motion activity. The iDriveAware application uses Fast Fourier Transform to convert the users smartphone accelerometer data to frequency domain from time domain. The frequency domain provides enhanced measurements of *x*, *y* and *z* axis data, including the band power of the signal, the energy (summation of the squared FFT parameters - coefficients), and the magnitude. The iDriveAware application determines the motion activity, at least in part by the mean, maximum and minimum values of accelerometer's *x*, *y* and *z* axis that come from the smartphone's movements.

74.

Independent Claim 36 of the '558 Patent, shown in italics, recites:

> *36. A system, comprising: one or more memories designed to store computer program code; one or more processors designed to execute the computer program code; and wherein the computer program code comprises:*

Defendant's iDriveAware system uses native applications running on top of the operating systems of smartphones that use memories, processors.

> *code to receive a time value and at least three streams of data sample values from one or more sensors of a wireless communication device (WCD) that*

> *is transported by a mobile thing (MT), each data sample value indicative of movement of the WCD at a corresponding time value;*

On information and belief, the iDriveAware application native applications monitor the accelerometer and gyroscope sensors for monitoring three streams of data ("the *x*, *y*, and *z* axis") from each device. The iDriveAware application software monitors the accelerometer sensor for linear acceleration and the gyroscope sensor for angular velocity to determine human activities (from sensor data), when users are not in vehicles, driving vehicles, riding in vehicles, when users drive aggressively/dangerously by making sharp/fast turns, use hard braking, accelerate fast, and when they handle and/or use smartphones while driving. Accelerometers are sensors which measure acceleration, the change in velocity over time. The iDriveAware application programs measure acceleration of the user and driver in time-segments, using first, second, et cetera, to confirm multiple time-segment matches to confirm most human activities.

Claim 36 continues:

> *code to recognize a particular set of data sample values as a reference for defining an orientation of the WCD in a coordinate system;*

Because smartphone movements are dynamic and therefore a phone's orientation is not a given, the iDriveAware application monitors the direction of the Earth's gravity to establish an orientation of the device by totaling the accelerometer axis data over short time periods that is equal to the Earth's gravity (9.807 m/s^2).

> *code to compute reference data based upon the recognition of the particular set, the reference data defining a relationship between each set of subsequent non-reference data sample values and the particular reference set of data sample values in the coordinate system; code to calculate movement data in the coordinate system of one or more other non-reference data sample values based upon the reference data;*

On information and belief, the iDriveAware application computes reference data within a framework (values, size, time, peaks, frequencies, filtering out dominant frequencies, etc.) with accelerometer data samples that come from wireless communication device.

> *and code to determine a mobile thing motion activity (MTMA) associated with the MT based upon the movement data.*

The iDriveAware application determines when users are not in vehicles, driving vehicles, riding in vehicles, when users drive aggressively/dangerously by making sharp/fast turns, use hard braking, accelerate fast, and when they handle and/or use smartphones while driving.

75.

Claim 37 of the '558 Patent, for example, recites:

> *37. The system of claim 36, wherein the computer program code further comprises: code to mathematically combine the data sample values of the particular reference set; and code to recognize the particular reference set as the reference when a combined value has a magnitude that is indicative of a relationship to Earth gravity.*

The iDriveAware application uses the smartphone's accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. Smartphone movements are dynamic; therefore the iDriveAware application monitors the direction of the Earth's gravity to establish an orientation of the device by totaling the accelerometer axis data over short time periods that is equal to the Earth's gravity.

76.

Claim 38 of the '558 Patent, for example, recites:

> *38. The system of claim 37, wherein the computer program code further comprises code to update the reference data each time the reference set of data samples is recognized.*

The iDriveAware application automatically updates the orientation and the *x*, *y* and *z* axis data as the smartphone changes is rotational degrees, so the vertical and/or horizontal measurements may be made.

77.

Claim 39 of the '558 Patent, for example, recites:

> *39. The system of claim 36, wherein: each set of data sample values includes a vector defined by three data sample values x, y, z; the reference data is a rotation matrix M; and the movement data comprises a vertical magnitude along the z axis and a horizontal magnitude along the x, y plane, both derived from a rotated vector, the rotated vector equal to the rotation matrix M multiplied by the vector associated with the other non-reference data sample values x, y, z.*

On information and belief, the iDriveAware application recalculates accelerometer axis data by adding, subtracting and/or combining accelerometer axis data based on a vertical magnitude and horizontal magnitude so the *x*, *y* and *z* axis data. Compared to horizontal and vertical smartphone movements, driving, braking, fast acceleration, smartphone usage while driving, and other motion activities may be accurately determined and measured.

78.

Claim 40 of the '558 Patent, for example, recites:

> *40. The system of claim 39, wherein the computer program code further comprises: code to transform the movement data to the frequency domain (FD) to produce FD data; code to compute one or more FD statistical metrics from the FD data; and wherein the MTMA identifying is based at least in part upon the FD statistical metrics.*

On information and belief, the iDriveAware application processes the smartphone's accelerometer *x*, *y* and *z* axis data in a frequency domain (FD) to determine at least part of the motion activity. The iDriveAware application uses the frequency domain to determine the maximum and minimum values of accelerometer's *x*, *y* and *z* axis in a two dimensional space so a time domain may enhance types of motion activities from the smartphone's movements.

79.

Claim 41 of the ’558 Patent, for example, recites:

> *41. The system of claim 36, wherein the movement data is in the time domain (TD) and wherein the code to compute comprises: code to compute a magnitude of the movement data in each of the two dimensions of space; code to compute one or more TD statistical metrics from the magnitudes; and wherein the MTMA determining is based at least in part upon the TD statistical metrics.*

On information and belief, the iDriveAware application uses a discrete wavelet transform to convert data to time-frequency domain from time domain. This provides a two dimensional representation of the power/magnitude of the signal and detailed coefficients through a statistical metrics so part of the motion activity may be determined.

80.

Independent Claim 42 of the ’558 Patent, shown in italics, recites:

> *42. A system, comprising: one or more memories designed to store computer program code; one or more processors designed to execute the computer program code; and wherein the computer program code comprises:*

The iDriveAware system uses wireless communication devices for determining human activities including driving vehicles, riding in vehicles and not driving, when users are aggressively driving, when they are using of smartphones and distracted while driving, and others by monitoring linear acceleration and angular velocity sensor data over time periods from the internal accelerometer sensor and/or gyroscope sensor. These devices provide three streams of data from the accelerometer and or gyroscope to accurately track movements and times, allowing it to efficiently determine and assess driving behaviors such as hard braking, cornering, distracted driving, and other dangerous events. The iDriveAware system uses native applications running on top of the operating systems of smartphones that use memories, processors.

> *code to receive first and second data from one or more sensors associated with a wireless communication device (WCD) transported by a mobile thing (MT), the first and second data indicative of movement of the WCD;*

The iDriveAware application includes code that receives data sample values from the accelerometers and gyroscope sensor data. The classifications and or raw accelerometer data are indicative of the movement.

> *code to determine reference data that defines a reference framework from the first data;*

The iDriveAware application includes code that defines how reference data for driving vehicles, hard braking, fast acceleration, and others will be compared to actual movements/acceleration. The iDriveAware application includes code that determines a vertical and/or horizontal framework so the reference data may used in determining when users are driving vehicles, hard braking, fast acceleration, and others.

> *code to normalize the second data with the reference data so that the second data can be analyzed in the reference framework; and*

Data sets from the movements (acceleration) is normalized by values, ranges, frequencies and/or time so as to be compared to reference data. The iDriveAware application code removes the rotational changes to the three dimensional (3D) coordinate system by normalizing the data with the gravity based determination of the vertical axis.

> *code to identify a mobile thing motion activity (MTMA) associated with the MT based upon the normalized second data.*

The iDriveAware application includes code that identifies motion activity, safe/unsafe styles of driving (hard braking/fast acceleration) based on the normalized data.

81.

Claim 43 of the ’558 Patent, for example, recites:

> *43. The system of claim 42, wherein the second data comprises a plurality of periodic samples.*

The iDriveAware application continually compares a plurality of accelerometer and/or gyroscope data samples from the smartphone.

82.

Claim 44 of the '558 Patent, for example, recites:

> *44. The system of claim 42, wherein the reference data is indicative of a relationship to Earth gravity.*

The iDriveAware application uses the earth's gravity to determine how to measure raw data against reference data.

83.

Claim 45 of the '558 Patent, for example, recites:

> *45. The system of claim 42, wherein the reference data is determined in the form of vector information indicative of a relation to Earth gravity by comparing the first data to a predefined numerical range.*

On information and belief, the iDriveAware application uses the earth's gravity to determine a magnitude and direction numbers (vector) for comparing a predefined numerical range.

84.

Claim 46 of the '558 Patent, for example, recites:

> *46. The system of claim 45, wherein the one or more sensors produce first, second, and third sample data along each of 3 axes in a three dimensional (3D) coordinate system and wherein the first data pertains to a value that equals one within a predefined range, the value computed by combining the first, second, and third sample data.*

Accelerometers are sensors which measure acceleration in an *x*, *y* and *z* axis, the change in velocity over time (SI unit: m/s^2). On information and belief, the iDriveAware application measures acceleration of the user and driver in time-segments, using first, second, et cetera, to confirm multiple time-segment matches to confirm most human activities.

85.

Claim 47 of the '558 Patent, for example, recites:

> *47. The system of claim 42, wherein the second data is in the time domain (TD) and wherein the code to identify comprises: code to compute magnitudes of the second data in each of the two dimensions of the 2D space; code to compute one or more TD statistical metrics from the magnitudes; and wherein the MTMA identifying is based at least in part upon the TD statistical metrics.*

On information and belief, the iDriveAware application uses a discrete wavelet transform to convert data to time-frequency domain from time domain. The iDriveAware application processes the smartphone's accelerometer *x*, *y* and *z* axis data in a two dimensional space for statistical metrics, including magnitudes of a motion activity.

86.

Claim 48 of the '558 Patent, for example, recites:

> *48. The system of claim 47, wherein the computer program code further comprises: code to transform the magnitudes from the TD to the frequency domain (FD) to produce FD data; code to compute one or more FD statistical metrics from the FD data; and wherein the MTMA identifying is based at least in part the FD statistical metrics.*

On information and belief, the iDriveAware application uses a discrete wavelet transform to convert data to time-frequency domain from time domain. This provides a two dimensional representation of the power/magnitude of the signal and detailed coefficients through a statistical metrics so part of the motion activity may be determined.

87.

Claim 49 of the '558 Patent, for example, recites:

> *49. The system of claim 48, wherein the MTMA is identified from a known plurality of MTMAs and wherein the computer program code further comprises: code to compute a score for each MTMA of the known plurality; and code to compare the scores to identify the MTMA.*

The iDriveAware application determines when a user is riding or driving in different types of vehicles by computing an average range and score that identifies which type vehicle the user is riding or driving. The iDriveAware application determines when a user is driving and accelerates too fast and/or brakes too hard or aggressively corners by assigning a number (score) that identifies motion activity types (for example, acceptable or unsafe).

88.

Claim 50 of the '558 Patent, for example, recites:

> *50. The system of claim 42, wherein the system is implemented in the WCD, in a computer system that is remote to the WCD, or in a combination of both.*

On information and belief, Defendant's iDriveAware application may communicate with servers and other remote computers to implement one or more of the steps in measuring and determining certain types of human activities.

89.

Claim 51 of the '558 Patent, for example, recites:

> *51. The system of claim 42, wherein the computer program code further comprises: code to determine an MTMA based action to be initiated based upon the identified MTMA; and code to initiate the MTMA based action.*

The iDriveAware application code determines a motion activity, such as when users are driving or riding in a vehicle and when users use their smartphone while driving; the identified motion activity will engage a different motion based activity, such as once driving is determined - it will monitor and report on hard braking, fast acceleration, aggressive cornering, and when users are unsafely using their smartphones.

90.

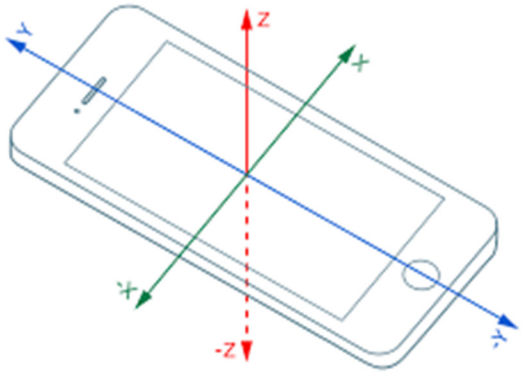
Independent Claim 52 of the '558 Patent, shown in italics, recites:

> *52. A system for implementation in a wireless communication device (WCD) that is designed to detect a plurality of mobile thing motion activities (MTMAs) associated with a mobile thing (MT), comprising: one or more memories designed to store computer program code; one or more processors designed to execute the computer program code; and wherein the computer program code comprises:*

Defendant's iDriveAware application uses wireless communication devices for determining human activities including driving vehicles, riding in vehicles and not driving, when users are aggressively driving, when they are using of smartphones and distracted while driving, and others by monitoring linear acceleration and angular velocity sensor data over time periods from the internal accelerometer sensor and/or gyroscope sensor. In particular, the iDriveAware application uses smartphones equipped with memories, processors, accelerometers for monitoring linear acceleration and gyroscopes for monitoring angular velocity over time periods for determining human activities such as driving vehicles, riding in vehicles and not driving, types of vehicles, when users are aggressively driving, when they are using of smartphones and distracted while driving, and others.

Claim 52 continues:

> *code to receive a plurality of data sample values from one or more sensors of the WCD that is transported by the MT, the data sample values indicative of movement of the WCD;*



The iDriveAware application includes code to monitor the *x*, *y*, and *z* axis of the accelerometers for measuring linear acceleration and gyroscopes for measuring angular velocity over time periods within smartphones that are indicative of movement of the wireless communication device. The application receives updated data from the accelerometer(s), gyroscope(s), and/or other sensors that is representative of the movements. The data may be provided in classifications, CMMotion Manager enabled raw x, y, and z axis data, and/or CMDeviceMotion objects and may include the device's orientation (or attitude) in three-dimensional space relative to a reference frame, the unbiased rotation rate, the current gravity vector, and/or the user-generated acceleration vector (without gravity).

> *code to compute reference data, the reference data defining a relationship between data sample values and a reference framework to enable comparison of data sample values;*

The iDriveAware application includes code that computes reference data with samples of live data to determine activities such as driving vehicles, hard braking and aggressive acceleration via activity identifications. In particular, the iDriveAware application uses code that computes motion activity reference data that includes a numerical integral that derived from the sum of acceleration within a predefined time period. Optional CMDeviceMotion and CMMotionManager provides accelerometer and gyroscope axis data for the application to process against reference data in a time, frequency and or size framework.

> *code to calculate movement data based upon the reference data and the data sample values; and*

The iDriveAware application includes code that computes movement data based upon the reference data and samples of live data. The iDriveAware application uses code that computes a numerical integral that's derived from the sum of acceleration within a predefined time period for a data sample value.

> *code to determine an MTMA associated with the MT based upon the movement data.*

The iDriveAware application includes code that identifies motion activity, users driving and safe/unsafe styles of driving (hard braking/fast acceleration) based on the normalized data. The iDriveAware application includes code that identifies the motion activity such as when users are not driving, driving, driving safely and when users drive unsafe (hard braking/fast acceleration/sharp or quick cornering) and when using their phones while driving based on the accelerometer and/or gyroscope movement data.

91.

Claim 53 of the '558 Patent, for example, recites:

> *53. The system of claim 52, wherein the computer program code further comprises: code to recognize a particular set of data sample values as a reference for defining an orientation of the WCD in a coordinate system; code to determine a rotation matrix based upon the particular set of reference data sample values; and code to calculate the movement data based upon the rotation matrix and one or more sets of the data sample values that are not the particular reference set.*

The iDriveAware application includes computer program code to recognize gravity measurements within the *x*, *y*, and *z* axis that defines an orientation. Code determines and extracts gravitational acceleration so an actual acceleration (without gravity's acceleration) may be accurately measured within data samples.

92.

Claim 54 of the '558 Patent, for example, recites:

> *54. The system of claim 52, wherein the data sample values are received from a plurality of the sensors.*

The iDriveAware application uses data sample values from accelerometer's and/or gyroscope's the *x*, *y* and *z* axis.

93.

Claim 55 of the '558 Patent, for example, recites:

> *55. The system of claim 54, wherein the plurality of sensors include at least an accelerometer and a gyroscope.*

The iDriveAware application uses accelerometers sensors for monitoring linear acceleration and gyroscopes sensors for monitoring angular velocity over time periods for determining human activities.

94.

Claim 56 of the '558 Patent, for example, recites:

> *56. The system of claim 55, wherein the plurality of sensors further includes a global positioning system (GPS) receiver.*

The iDriveAware application uses the global positioning system (GPS) receiver to determine speed and when users are driving unsafe by exceeding speed limits, and location for determine the vehicle's location.

95.

Claim 57 of the '558 Patent, for example, recites:

> *57. The system of claim 52, wherein the code to determine the MTMA comprises: code to compute a score for each MTMA of the plurality; and code to compare the scores to identify the MTMA.*

On information and belief, the iDriveAware application determines a score from each data sample through a measurement of the time domain and frequency domain. The iDriveAware application uses code that computes motion activity reference data that includes a numerical integral (or range) that is derived from the sum of acceleration within a predefined time period.

96.

Claim 58 of the '558 Patent, for example, recites:

> *58. The system of claim 52, wherein the reference data is indicative of a relationship to Earth gravity.*

The iDriveAware application subtracts earth's gravity influence from the raw accelerometer data so the reference data may accurately represent the motion activity.

97.

Claim 59 of the '558 Patent, for example, recites:

> *59. The system of claim 52, wherein the movement data is in the time domain (TD) and wherein the code to calculate comprises: code to compute a magnitude of the movement data in each of at least two dimensions of space; code to compute one or more TD statistical metrics from the magnitudes; and wherein the MTMA determining is based at least in part upon the TD statistical metrics.*

The iDriveAware application processes raw accelerometer data in the time domain and the code calculates the magnitude of the movement data in at least two dimensions of space; code computes the average magnitude total and/or energy average of the magnitude total to determine at least in part the motion activity.

98.

Claim 60 of the '558 Patent, for example, recites:

> *60. The system of claim 52, wherein the computer program code further comprises: code to transform the magnitudes from the TD to the frequency domain (FD) to produce FD data; code to compute one or more FD statistical metrics from the FD data; and wherein the MTMA determining is based at least in part the FD statistical metrics.*

The iDriveAware application processes raw accelerometer data in the time domain and the code calculates the magnitude of the movement data in the frequency domain to the time domain; the code produces statistical metrics from the frequency domain to determine at least in part the mobile activity.

COUNT III

DIRECT INFRINGEMENT OF THE '951 PATENT

99.

Plaintiff incorporates by reference the allegations of Paragraphs 1-18.

100.

Defendant has directly infringed and continues to directly infringe at least one or more claims of the '951 Patent, through, among other activities, making, using, and incorporating into Defendant's iDriveAware system automatic programs for monitoring human activities while driving. On information and belief, Defendant's iDriveAware system is provided, at least in part, as a smartphone-deployed driver-behavior monitoring and reporting solution.

101.

Independent Claim 1 of the '951 Patent, shown in italics, recites:

> *1. A wireless communications device (WCD), comprising: one or more memories that store computer program code; and one or more processors that execute the computer program code, the computer program code comprising:*

The iDriveAware application uses wireless communication devices for determining human activities including when driving vehicles, riding in vehicles, and when users aggressively drive (hard braking/fast acceleration) by monitoring acceleration sensor data over time periods from the internal accelerometer sensor and/or gyroscope sensor.

> *instructions to enter a first mode of operation involving a first investigation process with one or more sensors, the first investigation process capturing first data with the one or more sensors;*

The iDriveAware system enters into a first investigation process by monitoring accelerometer data and detects when the user is in a moving vehicle.

> *instructions to determine whether or not the first data is indicative of an activity relating to a user need for assistance, an accident, or a crime; and*

The iDriveAware application program monitors the user driving, and constantly monitor for when the user may need assistance.

> *instructions to, when the first data may involve the activity, enter into a second mode of operation involving a second investigation process that is different than the first investigation process and that involves the one or more sensors and/or one or more other sensors in order to capture second data that is further indicative of the activity.*

On information and belief, when the iDriveAware application program determines the user is driving the vehicle, i.e., not a passenger, the application monitors the driving skill for unsafe driving behaviors.

102.

Claim 3 of the '951 Patent, for example, recites:

> *3. The system of claim 1, wherein the computer program code further comprises: instructions to determine a human body physical activity (HBPA) associated with a WCD user based at least in part upon the first data and/or the second data; and instructions to communicate HBPA identification information to a remote computer system to permit analysis in connection with whether or not the first data corresponds to the activity.*

The iDriveAware application is an application on a smartphone that monitors the accelerometer and/or gyroscope to monitor *x*, *y* and *z* axis data in a time domain and/or predefined time length for determining a user activity (such as phone usage while driving). The information is sent to remote servers for additional verification and analysis of the activity.

103.

Claim 4 of the '951 Patent, for example, recites:

> *4. The system of claim 1, wherein the computer program code further comprises: instructions to communicate the first data to a remote computer system to permit analysis in connection with whether or not the first data involves the activity; and receiving information from the remote computer system, the information indicative of whether or not the first data corresponds to the activity.*

The iDriveAware application is an application on a smartphone that monitors the accelerometer and/or gyroscope to monitor *x*, *y* and *z* axis data in a time domain and/or predefined time length for determining a user activity. The information is sent to remote servers and when the user activity is confirmed, the server will combine the unsafe driver habits and send this updated information (scoring) to the user. *Id.*

104.

Independent Claim 10 of the '951 Patent, shown in italics, recites:

> *10. A wireless communications device (WCD), comprising: one or more memories that store computer program code; and one or more processors that execute the computer program code, the computer program code comprising:*

The iDriveAware application uses smartphones (wireless communication devices) equipped with processors, memory that execute program code, for determining human activities including when driving vehicles, riding in vehicles, and when users aggressively drive (hard braking/fast acceleration) occur by monitoring acceleration sensor data over time periods from the internal accelerometer sensor and/or gyroscope sensor.

> *instructions to produce data from one or more sensors associated with the WCD; instructions to determine a human body physical activity (HBPA) associated with a WCD user based upon the data;*

On information and belief, the iDriveAware application, when powered up, starts getting data from the accelerometer and/or gyroscope sensor(s); it enters into an investigation process to determine if the user is in a moving vehicle based on the data.

> *instructions to select a mode of operation from a set of modes, based upon the determined HBPA, the set including different modes of operation involving initiation of different investigation processes that capture different types of data; and*

When the iDriveAware system determines that a person is driving a vehicle, i.e., not a passenger, it starts monitoring the user's driving behavior to determine unsafe events such as sharp cornering, fast acceleration, hard braking, when the user is using their smartphone.

instructions to communicate the data to a remote computer system.

On information and belief, the iDriveAware application communicates the driver's information to remotely located computers/servers that determine driver scores and rewards.

COUNT IV

DIRECT INFRINGEMENT OF THE '914 PATENT

105.

Plaintiff incorporates by reference the allegations of Paragraphs 1-18.

106.

Defendant has directly infringed and continues to directly infringe at least one or more claims of the '914 Patent, through, among other activities, making, using, and incorporating into Defendant's iDriveAware system automatic programs for monitoring human activities while driving. On information and belief, Defendant's iDriveAware system is provided, at least in part, as a smartphone-deployed driver-behavior monitoring and reporting solution.

107.

Independent Claim 5 of the '914 Patent, shown in italics, recites:

> *5. A system comprising: at least one computing device; and at least one application executable in the at least one computing device, the application comprising:*

The iDriveAware application uses wireless communication devices for determining human activities including driving vehicles, when riding in vehicles, when users drive aggressively/dangerously and make sharp/fast turns, use hard braking, accelerate fast, and when they use smartphones while driving by monitoring the smartphone's accelerometer *x*, *y*, and *z* axis

sensor data over time periods. The iDriveAware application uses native applications running on the operating systems of smartphones that are equipped with an accelerometer and gyroscope sensors for monitoring three streams of data ("the *x*, *y*, and *z* axis") from each device. The iDriveAware application software monitors the accelerometer sensor for linear acceleration and the gyroscope sensor for angular velocity to determine human activities (from sensor data), when users are not in vehicles, when driving vehicles, riding in vehicles, when users drive aggressively/dangerously by making sharp/fast turns, use hard braking, accelerate fast, and when they handle and/or use smartphones while driving.

logic that determines a user activity and/or user surroundings;

The iDriveAware application uses accelerometer reference data (for determining activities such when users are driving vehicles including types of driving including hard braking and fast acceleration by values, time-series (samples), and/or frequencies. The iDriveAware application monitors the accelerometer sensor for linear acceleration and/or the gyroscope sensor for angular velocity for using logic to determine human activities (from sensor data), when users are not in vehicles, driving vehicles, riding in vehicles, when users drive aggressively/dangerously by making sharp/fast turns, use hard braking, accelerate fast, and when they handle and/or use smartphones while driving.

logic that determines a surveillance mode that corresponds to the user activity and/or the user surroundings;

On information and belief, the iDriveAware application uses logic for determining a surveillance mode that activates and corresponds to a user that is driving.

logic that facilitates a user-defined response to the user activity and/or the user surroundings; and

On information and belief, the iDriveAware application facilitates a user-defined response when driving is detected, allowing the user to enter a riding mode (not driving) of the surveillance monitoring.

> *logic that communicates surveillance information to at least one remotely located computer device.*

On information and belief, the iDriveAware application communicates surveillance information (driver habits, i.e. phone usage, fast acceleration, hard braking, fast cornering) over a time period to remotely located computers, where this information is stored, used for scoring, and messaged to fleet managers.

Claim 6 of the ’914 Patent, for example, recites:

> *6. The system of claim 5, wherein the logic that facilitates the user-defined response further comprises logic that automatically activates the user-defined response to the user activity and/or the user surroundings.*

The iDriveAware application monitors the accelerometer and/or gyroscope sensors to automatically determines when a user is in a vehicle and driving.

108.

Independent Claim 15 of the ’914 Patent, shown in italics, recites:

> *15. A method comprising the steps of: determining, by a computing device, a user activity and/or user surroundings;*

The iDriveAware application uses applications on smartphones (wireless communication devices) for automatically detecting when driving starts and stops, when users are driving and/or riding in vehicles, when users are not driving and/or riding in vehicles. The iDriveAware application uses the phone's sensors to measure a vehicle's driving dynamics.

> *determining, by the computing device, a surveillance mode that corresponds to the user activity and/or the user surroundings;*

The iDriveAware application automatically determines surveillance modes for when people start (or stop) driving, when driving and using smartphones, when they are driving aggressively, and others.

> *facilitating, by the computing device, a user-defined response to the user activity and/or the user surroundings; and*

On information and belief, the iDriveAware application will prompt and/or remind the user to acknowledge when they are riding in vehicles but not driving, and when the system incorrectly logs driving. If unsafe driving is detected, the system and starts onscreen instruction messaging to the driver to improve driving skills.

> *communicating, by the computing device, surveillance information to at least one remotely located computer device.*

On information and belief, the iDriveAware application communicates surveillance information (such as driving or riding, using the phone while driving, fast acceleration and hard braking) over a time period to remotely located computers that determine discounts and rewards.

109.

Claim 20 of the ’914 Patent, for example, recites:

> *20. The method of claim 15, wherein the step of determining the user activity and/or the user surroundings further comprises the step of matching, by the computing device, sensor data to at least one algorithm with at least one user-defined parameter.*

The iDriveAware application allows the user to enter a riding mode—not driving. When the user selects driving, the iDriveAware application engages algorithms for determining phone usage and when the driver uses sharp cornering.

COUNT V

DIRECT INFRINGEMENT OF THE ’273 PATENT

110.

Plaintiff incorporates by reference the allegations of Paragraphs 1-18.

111.

Defendant has directly infringed and continues to directly infringe at least one or more claims of the ’273 Patent, through, among other activities, making, using, and incorporating into Defendant’s SafetyAware system automatic programs for monitoring human activities while working alone or remotely. On information and belief, Defendant’s SafetyAware system is provided, at least in part, as a smartphone-deployed worker safety monitoring and reporting solution.

112.

Independent Claim 1 of the ’273 Patent, shown in italics, recites:

> *1. A method, comprising: receiving a time value and three streams of data sample values from an accelerometer of a wireless communication device (WCD) that is transported by a mobile thing (MT), each data sample value indicative of an acceleration of the WCD along an axis of a three dimensional (3D) coordinate system at a corresponding time value;*

The SafetyAware system uses native applications running on top of the operating systems of smartphones that are equipped with an accelerometer and gyroscope sensors for monitoring three streams of data (“the *x*, *y*, and *z* axis”) from each device. The SafetyAware application software monitors the accelerometer sensor for linear acceleration and the gyroscope sensor for angular velocity to determine human activities (from sensor data)for providing safety when falls occur.

> *recognizing a particular set of data sample values as a reference in the 3D coordinate system for defining a relationship between an orientation of the WCD and a two dimensional (2D) coordinate system;*

The SafetyAware application calculates accelerometer *x*, *y* and *z* axis data that totals the constant gravity acceleration. The acceleration from gravity may be removed by reducing the amount from each axis or the total amount when combining all three axis. Determining the vertical direction of gravity provides an orientation of the smartphone in a two dimensional measurement system.

> *computing reference data based upon the recognition of the particular set, the reference data defining a relationship between each set of subsequent non-reference data sample values and the particular reference set of data sample values in the 2D coordinate system;*

The gravity reference data is used to recognize subsequent non-reference data sample values in a 2D coordinate system, including vertical and horizontal positions. On information and belief, the SafetyAware application computes reference data including a numeric magnitude and frequency over a predetermined time period. Raw accelerometer data that represents the acceleration of the human activity are compared by measuring the magnitude and frequency over the same predetermined time period as the reference data.

> *calculating movement data in the 2D coordinate system of one or more other non-reference data sample values based upon the reference data; and*

On information and belief, the SafetyAware application calculates the movement data in a two dimensional magnitude and frequency measurement over time. Calculating movement data in the 2D coordinate system is a means to accurately determine vertical and horizontal positions, and also for determining how to correct and or use the non-reference (live) accelerometer data sample values based on the reference data removing non-human movements associated with gravity.

> *determining a moving thing motion activity (MTMA) associated with the MT based upon the movement data.*

The motion activity is determined based upon accelerations that exclude gravity measurements for detecting a change in position, a lack of movement, or a sudden impact. When one of these is

detected, a notification can be sent to the lone worker's employer to signal that they need assistance.

113.

Claim 2 of the '273 Patent, for example, recites:

> *2. The method of claim 1, further comprising: prior to recognizing, mathematically combining the data sample values of the particular reference set; and recognizing the particular reference set as the reference when a combined value has a magnitude that is indicative of a relationship to Earth gravity.*

The SafetyAware application effectively determines gravity by combining reference sets of data from two or more axis of the accelerometer, that in combination have a magnitude value that equals earths gravity.

114.

Claim 3 of the '273 Patent, for example, recites:

> *3. The method of claim 2, further comprising updating the reference data each time the reference set of data samples is recognized.*

The SafetyAware application updates the gravity reference data, multiple times per second, so acceleration from the movement of the smartphone may be accurately measured, regardless of smartphone orientation.

115.

Claim 4 of the '273 Patent, for example, recites:

> *4. The method of claim 1, wherein: each set of data sample values includes a vector defined by three data sample values x, y, z; the reference data is a rotation matrix M; and the movement data comprises a vertical magnitude along the z axis and a horizontal magnitude along the x, y plane, both derived from a rotated vector, the rotated vector equal to the rotation matrix M multiplied by the vector associated with the other non-reference data sample values x, y, z.*

The SafetyAware application uses accelerometer *x*, *y* and *z* axes, i.e., an acceleration vector, which is then compared to a rotation matrix M for reference. The measurement of the movement data is calculated by the vertical and horizontal magnitudes, which are derived from a rotated vector. This vector is obtained by multiplying the rotation matrix M with the vector of non-reference data sample values *x*, *y*, and *z*.

116.

Claim 5 of the '273 Patent, for example, recites:

> *5. The method of claim 4, further comprising: transforming the movement data to the frequency domain (FD) to produce FD data; computing one or more FD statistical metrics from the FD data; and wherein the MTMA identifying is based at least in part upon the FD statistical metrics.*

The SafetyAware application employs Frequency Domain (FD) analysis in transforming accelerometer and gyroscope movements into data that can be used to normalize the data, such as impact levels, non-movement on all axes (with the removal of gravity). The motion activity (change of position, lack of movement, and or impact) may at least be in part determined based on FD statistical metrics.

117.

Claim 6 of the '273 Patent, for example, recites:

> *6. The method of claim 5, wherein the MTMA is identified from a set of MTMAs and further comprising: computing a score for each MTMA of the set; and comparing the scores to identify the MTMA.*

On information and belief, the SafetyAware application uses a list of reference motion activities, each having a unique numeric score to be used for matching.

118.

Claim 7 of the '273 Patent, for example, recites:

> *7. The method of claim 1, wherein the MTMA is identified from a set of MTMAs and further comprising: computing a score for each MTMA of the set; and comparing the scores to identify the MTMA.*

On information and belief, the SafetyAware application uses a list of reference motion activities, each having a unique numeric score that can be matched with accelerometer data coming from motion activities.

119.

Claim 8 of the ’273 Patent, for example, recites:

> *8. The method of claim 1, wherein the reference data is in the form of a rotation matrix that normalizes the sets of non-reference data sample values with respect to Earth gravity.*

The SafetyAware application uses a rotation matrix to normalize non-reference data sample values in relation to Earth gravity. This matrix allows vertical impacts, non-movement, and position changes to be determined without gravity influences that accelerometers automatically measure.

120.

Claim 9 of the ’273 Patent, for example, recites:

> *9. The method of claim 1, wherein the movement data is in the time domain (TD) and wherein the computing comprises: computing a magnitude of the movement data in each of the two dimensions of space; computing one or more TD statistical metrics from the magnitudes; and wherein the MTMA determining is based at least in part upon the TD statistical metrics.*

The SafetyAware application detects movement data in the time domain (TD) and determines impacts, non-movement, and position changes based on TD statistical metrics. The process involves computing the magnitude of movement data in two spatial dimensions and deriving TD statistical metrics from the magnitudes.

121.

Claim 10 of the ’273 Patent, for example, recites:

> *10. The method of claim 9, further comprising: transforming the magnitudes from the TD to the frequency domain (FD) to produce FD data; computing one or more FD statistical metrics from the FD data; and wherein the MTMA determining is based at least in part the FD statistical metrics.*

On information and belief, the SafetyAware application transforms magnitudes from the time domain to the frequency domain, computing statistical metrics from the frequency domain data, and determining impacts, non-movement, and position changes based on these statistical metrics.

122.

Claim 11 of the '273 Patent, for example, recites:

> *11. The method of claim 1, wherein one or more of the steps of the method is implemented in the WCD.*

The SafetyAware application implements one or more steps of the method in the smartphone, including processing of raw sensor data.

123.

Independent Claim 12 of the '273 Patent, shown in italics, recites:

> *12. A method, comprising: receiving first and second data from an accelerometer associated with a wireless communication device (WCD) transported by a mobile thing (MT), the first and second data indicative of acceleration of the WCD;*

The SafetyAware system uses wireless communication devices (WCDs) transported by users to effectively determine, monitor, and decrease response times for falls. The WCDs are equipped with memory, processors, co-processors, and three dimensional accelerometers and/or gyroscopes. Claim 12 continues:

> *determining reference data that defines a reference framework in two dimensions (2D) of space from the first data;*

The SafetyAware application uses reference data that determines peaks (and up and down) (2D) inertia motions by the accelerometer. The SafetyAware application calculates reference data by monitoring the accelerometer *x*, *y* and *z* axis data to identify gravity data within the *x*, *y* and *z* axis.

The gravity data is also used to determine the vertical position (z axis) of the data so that measurements associated with vertical and horizontal movements may be accurately measured.

> *normalizing the second data with the reference data so that the second data can be analyzed in the 2D space; and*

In response to receiving live data, the data is sampled by time, ranges, and/or averages, which is using a 2D analysis. Second data is normalized by removing the gravity acceleration. The second data is normalized by determining a rotational matrix that is based on the direction of gravity.

> *identifying a mobile thing motion activity (MTMA) associated with the MT based upon the normalized second data.*

The SafetyAware application identifies motion activity based upon accelerations that exclude gravity measurements for detecting a change in position, a lack of movement, or a sudden impact. When one of these is detected, a notification can be sent to the lone worker's employer to signal that they need assistance.

124.

Claim 13 of the '273 Patent, for example, recites:

> *13. The method of claim 12, wherein the second data comprises a plurality of periodic samples.*

The SafetyAware application monitors a plurality of data samples from three dimensional accelerometer and or gyroscope x, y, and z axis data with corresponding time values in determining movements with 2D changes and verifies motion activities by determining when second data samples match the previous data sample to formulate matching pattern. A motion activity gets confirmed when two or more data samples match a motion activity.

125.

Claim 14 of the '273 Patent, for example, recites:

> *14. The method of claim 12, wherein the reference data is indicative of a relationship to Earth gravity.*

The SafetyAware application determines Earth's gravity to determine the vertical (*z* axis) position by combining reference sets of data from two or more axis of the accelerometer, that in combination have a magnitude value that equals earths gravity. The vertical position also allows the *x* and *y* axis to be representative of the horizontal data.

126.

Claim 15 of the '273 Patent, for example, recites:

> *15. The method of claim 12, wherein the reference data is determined in the form of vector information indicative of a relation to Earth gravity by comparing the first data to a predefined numerical range.*

The SafetyAware application uses the accelerometer data to determine a vertical position (and also horizontal position) by monitoring the acceleration of Earth's gravity with corresponding time values and comparing that data to a predefined numerical range that identifies Earth's gravity.

127.

Claim 16 of the '273 Patent, for example, recites:

> *16. The method of claim 15, wherein the accelerometer produces first, second, and third sample data along each of 3 axes in a three dimensional (3D) coordinate system and wherein the first data pertains to a value that equals one within a predefined range, the value computed by combining the first, second, and third sample data.*

The SafetyAware application uses the accelerometer that generates data along each of the 3 axes in a 3D coordinate system. This data includes a first value that falls within a predefined range, which is calculated by combining the first, second, and third sample data. The SafetyAware application verifies motion activities by determining when second data samples match the previous data sample to formulate matching pattern. A motion activity gets confirmed when two or more data samples match a motion activity.

128.

Claim 17 of the '273 Patent, for example, recites:

> *17. The method of claim 12, wherein the second data is in the time domain (TD) and wherein the identifying comprises:*
> *computing magnitudes of the second data in each of the two dimensions of the 2D space;*
> *computing one or more TD statistical metrics from the magnitudes; and*
> *wherein the MTMA identifying is based at least in part upon the TD statistical metrics.*

The SafetyAware application uses the second data as its represented in the time domain (TD). To identify MTMA such as position changes, falls and non-movements, it computes the magnitude of the second data in the two dimensions of the 2D space. From these magnitudes, it calculates one or more TD statistical metrics. The identification of MTMA relies on these TD statistical metrics.

129.

Claim 18 of the '273 Patent, for example, recites:

> *18. The method of claim 17, further comprising: transforming the magnitudes from the TD to the frequency domain (FD) to produce FD data; computing one or more FD statistical metrics from the FD data; and wherein the MTMA identifying is based at least in part the FD statistical metrics.*

On information and belief, the SafetyAware application transforms the movement data (from the accelerometer *x*, *y* and *z* axis) from the time domain (TD) to the frequency domain (FD) to produce data that determines magnitude averages, amounts, and other statistical metrics used in identifying the motion activity. From this data, one or more statistical metrics are computed, which are then used to partially identify the position changes, falls and non-movements.

130.

Claim 19 of the '273 Patent, for example, recites:

> *19. The method of claim 18, wherein the MTMA is identified from a known plurality of MTMAs and further comprising: computing a score for each MTMA of the known plurality; and comparing the scores to identify the MTMA.*

On information and belief, the SafetyAware application determines motion activities such as falls, and it determines if the user preference of activation has been met. It also provides a score for moderate, high and fall from height to identify type of falls.

131.

Claim 20 of the '273 Patent, for example, recites:

> *20. The method of claim 12, wherein one or more of the steps of the method is implemented in the WCD.*

The SafetyAware application implements one or more steps of the method in the smartphone. While servers and systems that are capable of communicating with the devices, and some of the functionality may be provided to them, raw sensor data is used within the devices.

132.

Claim 21 of the '273 Patent, for example, recites:

> *21. The method of claim 12, further comprising: determining an MTMA based action to be initiated based upon the identified MTMA; and initiating an MTMA based action.*

The SafetyAware application program determines motion activities such as falls. A count-down timer is first engaged based on a fall, and if not canceled, an alarm state is activated that will contact third parties for assistance.

133.

Independent Claim 22 of the '273 Patent, shown in italics, recites:

> *22. A method, comprising: receiving a time value and three streams of data sample values from an accelerometer of a wireless communication device (WCD) that is transported by a mobile thing (MT), each data sample value indicative of an acceleration of the WCD along an axis of a three dimensional (3D) coordinate system at a corresponding time value;*

The SafetyAware system uses wireless communication devices (WCDs) transported by users to effectively determine, monitor, and decrease response times for falls. The WCDs are equipped with memory, processors, co-processors, and three dimensional accelerometers and/or gyroscopes. Claim 22 continues:

> *computing reference data, the reference data defining a relationship between data sample values and a reference framework to enable comparison of 3D sets of data sample values;*

The SafetyAware application uses reference data, such as data that represents a fall as motion activity classifications, CMDeviceMotion objects and/or via the CMMotionManager for raw accelerometer and gyroscope *x*, *y*, and *z* axis sensor data. The reference data processes classifications over time periods to confirm changes and validate the motion activity for use in the application. The CMDeviceMotion and CMMotionManager provides accelerometer and gyroscope axis data for the mobile telematics application to process against reference data in a time, frequency and/or size framework.

> *calculating movement data for each set based upon the reference data; and*

The SafetyAware application calculates movement data from classifications, objects and/or raw accelerometer data (the live data).

> *determining a moving thing motion activity (MTMA) associated with the MT based upon the movement data.*

By comparing the reference data with live accelerometer data that is normalized over time periods (by determining peaks, frequencies, timing, et cetera), the motion activity is determined, confirming activity changes over random false triggers.

134.

Claim 23 of the ’273 Patent, for example, recites:

> *23. The method of claim 22, further comprising:*

> *recognizing a particular set of data sample values as a reference in the 3D coordinate system for defining a relationship between an orientation of the WCD and a two dimensional 2D coordinate system;*
> *determining a rotation matrix based upon the particular set of reference data sample values; and*
> *calculating the movement data based upon the rotation matrix and one or more sets of the data sample values that are not the particular reference set.*

The SafetyAware application uses a method that involves recognizing a specific set of data sample values as a reference in a 3D coordinate system. This reference helps define the relationship between the orientation of the WCD and a two-dimensional coordinate system. Additionally, a rotation matrix is determined using the reference data sample values, and movement data is calculated based on this matrix and other sets of data sample values that are not the reference set.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for relief that the Court enter judgment in their favor and against the Defendant, granting the following relief:

That the Court enter judgment that one or more claims of the ’846 Patent have been infringed either literally and/or under the doctrine of equivalents, by Defendant;

That the Court enter judgment that one or more claims of the ’558 Patent have been infringed either literally and/or under the doctrine of equivalents, by Defendant;

That the Court enter judgment that one or more claims of the’951 Patent have been infringed either literally and/or under the doctrine of equivalents, by Defendant;

That the Court enter judgment that one or more claims of the ’914 Patent have been infringed either literally and/or under the doctrine of equivalents, by Defendant;

That the Court enter judgment that one or more claims of the ’273 Patent have been infringed either literally and/or under the doctrine of equivalents, by Defendant;

That Defendant be ordered to pay damages adequate to compensate Plaintiff for its acts of infringement, pursuant to 35 U.S.C. § 284;

That Plaintiff be awarded increased damages under 35 U.S.C. § 284 due to Defendant’s willful infringement of the ’846, ’558,’951, ’914, and ’273 Patents;

That the Court find that this case is exceptional and award Plaintiff reasonable attorneys’ fees pursuant to 35 U.S.C. § 285;

That Defendant, its officers, agents, employees, and those acting in privity with it, be preliminarily enjoined from further infringement, contributory infringement, and/or inducing infringement of the patents-in-suit, pursuant to 35 U.S.C. § 283;

That Defendant, its officers, agents, employees, and those acting in privity with it, be permanently enjoined from further infringement, contributory infringement, and/or inducing infringement of the patents-in-suit, pursuant to 35 U.S.C. § 283;

That Defendant be ordered to pay prejudgment and post-judgment interest;

That Defendant be ordered to pay all costs associated with this action; and

That Plaintiff be granted such other and additional relief as the Court deems just, equitable, and proper.

DEMAND FOR JURY TRIAL

Pursuant to Fed. R. Civ. P. 38(b), Plaintiff demands a jury trial on all issues justiciable by a jury.

Respectfully Submitted,

Dated: July 18, 2024

/s/ Brett Thomas Cooke

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