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

BIG WILL ENTERPRISES INC. Plaintiff, v. SOLUTIONS INTO MOTION LIMITED Defendant.	Civil Action File No.: 1:24-cv-00833 **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 Solutions Into Motion Limited ("SIM" 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"); 8,559,914 ("the '914 Patent"); and 8,452,273 ("the '273 Patent"). Copies of the '846 Patent, the '558 Patent, the '914 Patent and the '273 Patent are attached as Exhibits 1-4.

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, '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 Solutions in Motion Limited. is a corporation organized under the laws of Canada, having its headquarters at 20 Roy Boulevard, Unit 15, Brantford, Ontario, N3R7K2, Canada. SIM 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 names www.trackem.com and www.wheresafe.com, which are 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. 8,559,914 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 '914 Patent and the '273 Patents which are asserted in this action, as well as other BWE patents.

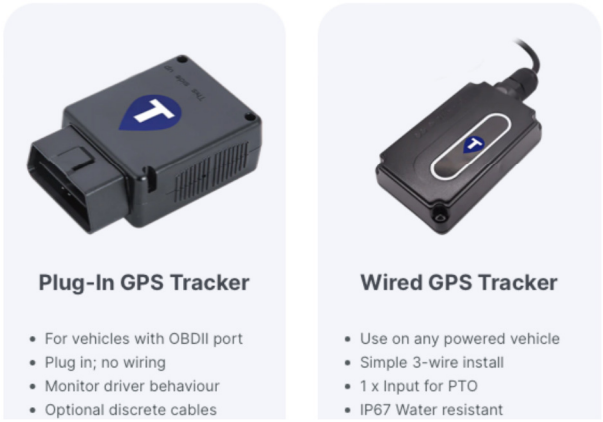
14.

Defendant is a leading North America supplier of tracking and telematic systems, including those that provide for the monitoring of driver behavior with accelerometer and/or gyroscope sensor data. Defendant also conducts business under the names TrackemGPS ("Trackem") and WhereSafe. Defendant provides an extensive family of tracking devices, including the Trackem Plug-In GPS Tracker and the WhereSafe OBD Tracker, hereinafter collectively referred to as "OBD Trackers," and the Trackem Wired GPS Tracker and the WhereSafe Wired Tracker, hereinafter collectively referred to as "Wired Trackers."

15.

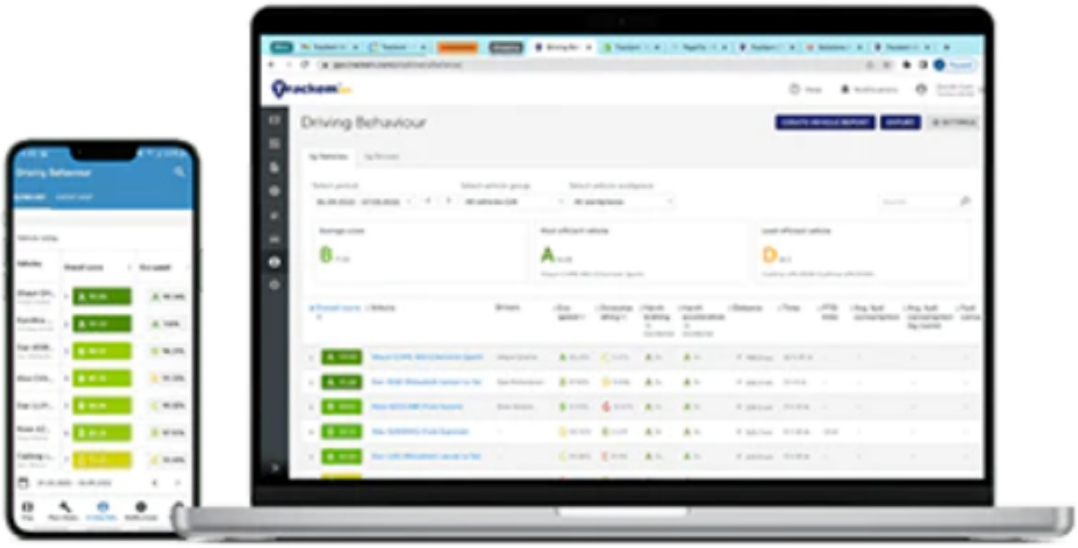
Defendant's OBD Trackers and Wired Trackers, along with their related systems and smart phone applications, utilize accelerometer and/or gyroscope sensors to monitor *x*, *y*, and *z* axis data to enable the unique detection of driving and driving behaviors such as fast accelerations, hard braking, fast cornering, and other unsafe events. By utilizing the power of sensor axis data from these sensors, Defendant's products and services can improve customer service standards, and reduce accidents, insurance costs and fuel consumption, while enhancing driver behavior.

> Most passenger vehicles built after 1996 have an Onboard Diagnostic (OBDII) port, usually located near the steering column. The Trackem OBD GPS Tracker simply plugs into this port, with no wiring required. Harsh driving detection is supported, allowing fleet managers to see which drivers are rough on the vehicles. Optional cables allow for discrete installations, leaving the port itself empty and available for use.
> [https://www.trackem.com/products/plug-in-gps-tracker-obdii.]
>
> OBD Tracker
> Simply plug the tracker into your OBD port and start tracking
> Optional cable for discrete installation
> Harsh braking and acceleration alerts
> No battery required
> [https://www.wheresafe.com/products/obdii-tracker-kit.]



https://www.trackem.com/pages/driver-behavior.

The Driver Behaviour analytics allows managers or business operators to understand specific driving trends for individual drivers and compared to all drivers in the fleet. The system analyzes average speeds, idling, harsh braking, acceleration and cornering and uses user input weighting to calculate driver scores and fleet scores. This makes it very easy to identify issues and address them, for safety, fuel efficiency and vehicle wear reduction.



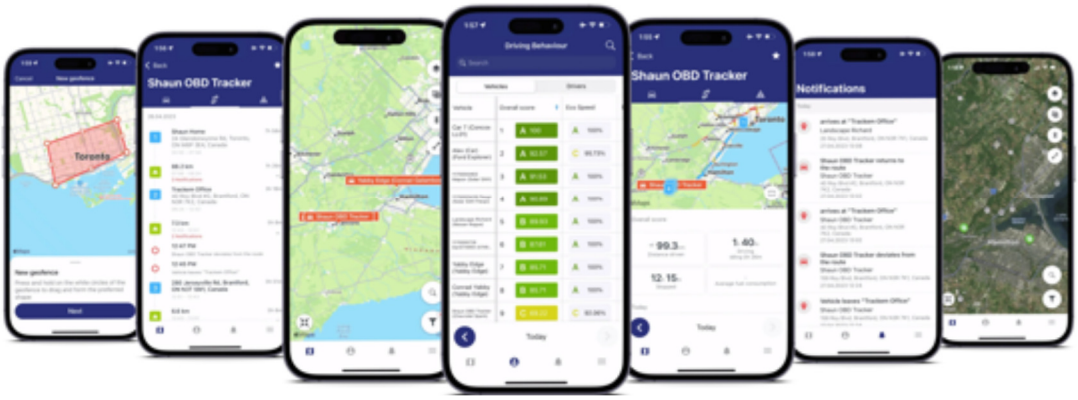
By monitoring driver behavior, companies can identify risky driving habits and take steps to correct them. This can help prevent accidents and keep drivers and other road users safe.

> By improving driver behavior, companies can reduce the frequency and severity of accidents, which can lead to lower insurance premiums and vehicle repair costs.
>
> Monitoring driver behavior can help companies identify areas where drivers can improve their performance, such as reducing idling time or avoiding harsh acceleration and braking. This can help companies optimize their operations and reduce fuel consumption. [*Id.*]

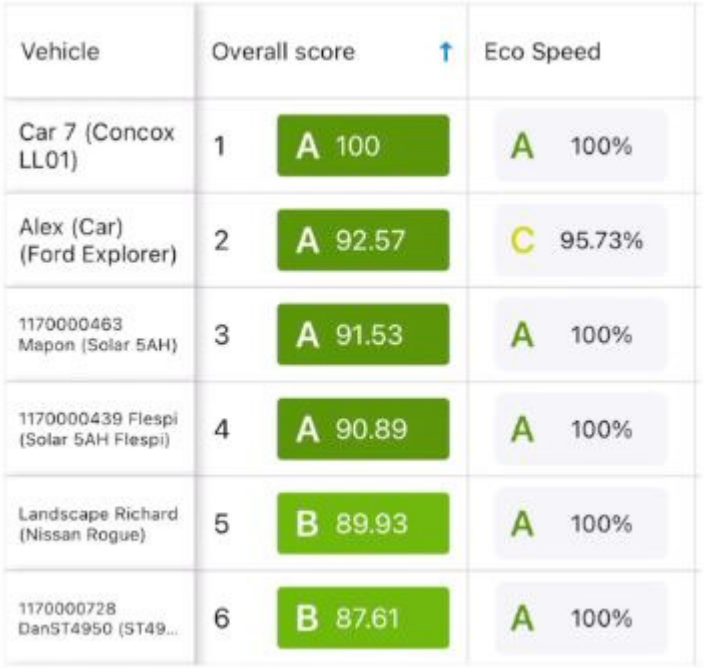
16.

Defendant's OBD Trackers and Wired Trackers are wireless communications devices and have associated smartphone applications.

> WhereSafe is real-time tracking technology and not less reliable SMS-based location by request services. WhereSafe is always tracking and will notify you of issues IF you need to know, so you don't have to constantly monitor.
>
> The WhereSafe smartphone app keeps in constant contact with your tracker to provide access and updates at a glance or by SMS or email notifications, if a set parameter has been violated (eg. speed, geofence, or night driving).
>
> The hardware is plug and play, and activated once the app is installed on your smartphone. The app was built to allow users to put down their phone, eliminating manual check-ins so WhereSafe can do its job and notify you IF you need to know.
>
> Protect Your Passions – WhereSafe is flexible and can be used to protect young drivers, elderly parents and your assets, which can include cars, boats, RVs, equipment, ATVs and more.
> [https://www.wheresafe.com/pages/how-wheresafe-works.]
>
> Trackem is constantly working on improving our user experience and now offers two new mobile GPS tracking apps for our clients. The main Trackem app provides users and managers with most of the capabilities of what web interface, from a smartphone. Restrict user access levels for various drivers or team members.



The app features most of the functionality of the web interface, including:
• Keep track of the location of your vehicles, assets, and equipment in real-time.
• Receive immediate notifications about fleet vehicles and asset activity.
• Monitor driving behavior to minimize vehicle wear.



https://www.trackem.com/pages/mobile-apps.

COUNT I

DIRECT INFRINGEMENT OF THE '846 PATENT

17.

Plaintiff incorporates by reference the allegations of Paragraphs 1-16.

18.

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 OBS and Wired Tracker devices and systems automatic programs for monitoring human activities while driving.

19.

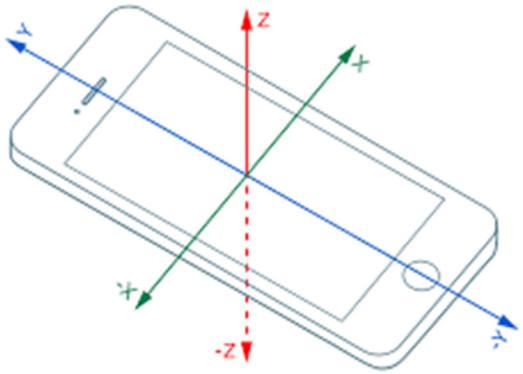
Independent Claim 1 of the '846 Patent, shown in italics, recites:

> *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 OBD and Wired Trackers are devices each with wireless communication ("the WCD") using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify *x*, *y*, and *z* axis accelerations (i.e., vibrations and movements), of vehicles ("the mobile thing") it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) ("the motion activity") accurately. Defendant's technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky driving behaviors.

> *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 OBD and Wired Tracker devices each use 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 aggressive driving, fast cornering, et cetera). The data from the 3 axis accelerometer and/or gyroscope 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 OBD and Wired Tracker systems each offer a complete ecosystem for drivers to improve their driving skills with a coaching system that monitors driver behaviors and provides feedback through emails, SMS, and applications. These driver account-based advertisements are components of a comprehensive telematics system aimed at enhancing driving behavior, mitigating insurance, hiring, and other expenses.

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 device 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 variety of live data sets and the degree of accuracy with which they correlate to the referenced motion activity data, the determination of the motion activity is made based on predefined thresholds and ranges in the frequency and time domains. This method ensures an efficient and reliable assessment of the motion activity.

20.

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.*

Each of the OBD and Wired Tracker systems monitors driver behaviors and provides advertisement notifications and/or reward messages so participants are automatically enrolled to receive messages and/or summary emails.

21.

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.*

Each of the OBD and Wired Tracker systems monitors driver behaviors and provides advertisement notifications and/or reward messages based on the unique ID of the Tracker device.

22.

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, each of Defendant's OBD and Wired Tracker devices 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 driver and fleet managers.

23.

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, each of the OBD and Wired Tracker devices monitors driver behaviors and provides driver scores and awards to rank and improve driver behaviors.

24.

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, each of Defendant's OBD and Wired Tracker devices uses sensor data from the accelerometer and/or the gyroscope.

25.

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, each of Defendant's OBD and Wired Tracker devices and systems monitor driver behavior from the device internal sensors and also use servers to make certain decisions that enhance the accuracy of the 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 unnecessary acceleration.

26.

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, each of Defendant's OBD and Wired Tracker devices and systems monitor driver behavior and uses the sensors and also uses servers to make certain decisions that are remote from the devices.

27.

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, each of Defendant’s OBD and Wired Tracker devices 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.

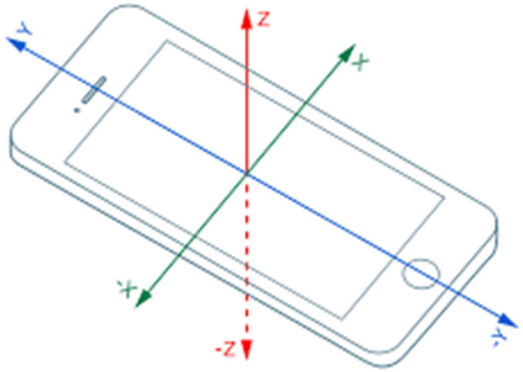
28.

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;*

The OBD and Wired Trackers are devices each with wireless communication (“the WCD”) using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify *x*, *y*, and *z* axis accelerations (*i.e.*, vibrations and movements), of vehicles (“the mobile thing”) it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) (“the motion activity”) accurately. Defendant’s Plug-In GPS Tracker device and telematics systems help to improve driving skills with a coaching system that monitors driver behaviors and provides feedback through emails, SMS, and applications.

> *one or more sensors associated with the WCD designed to produce sensor data, the sensor data indicative of physical movement of the WCD in three dimensional space and including 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;*



Each of the OBD and Wired Tracker devices 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 aggressive driving, fast cornering, et cetera). 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;*

Each of the OBD and Wired Tracker devices uses memory to store the program code and processor(s) to execute the program code. The code determines the motion activity for determining at least in part through the use of the sensor data and the statistical analysis of the movement of the device.

> *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*

Each of the OBD and Wired Tracker devices includes code designed to communicate sensor data or the identified motion activity to a server that processes the driver updates into scores and

notifications that are used in the advertisements sent to driver. The system offers a complete ecosystem for drivers to improve their driving skills with a coaching system that monitors driver behaviors and provides feedback through emails, SMS, and applications. These driver account-based advertisements are components of a comprehensive telematics system aimed at enhancing driving behavior, mitigating insurance, hiring, and other expenses.

> *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;*

Each of the OBD and Wired Tracker devices includes code that 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.*

Each of the OBD and Wired Tracker devices includes codeused 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.

29.

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.*

Each of Defendant's OBD and Wired Tracker devices monitors individual driver behaviors, and provides scoring, coaching, and details to each driver. The system also uses a unique identifier to connect and send messages from the server to a driver's application.

30.

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, each of Defendant's OBD and Wired Tracker devices determines a user's location 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.

31.

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 12, each of Defendant's OBD and Wired Tracker devices uses sensor data from the accelerometer and/or the gyroscope.

32.

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.*

Each of the OBD and Wired Tracker devices uses code to determine a mathematical relationship between reference x, y and z data and different *x*, *y*, and *z* data sets coming from the accelerometer and or gyroscope in the 3D coordinate system. Multiple data sets matching an activity over a time period is needed to confirm most activities before it is logged.

COUNT II

DIRECT INFRINGEMENT OF THE '558 PATENT

33.

Plaintiff incorporates by reference the allegations of Paragraphs 1-16.

34.

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 OBD and Wired Tracker devices and systems automatic programs for monitoring human activities while driving.

35.

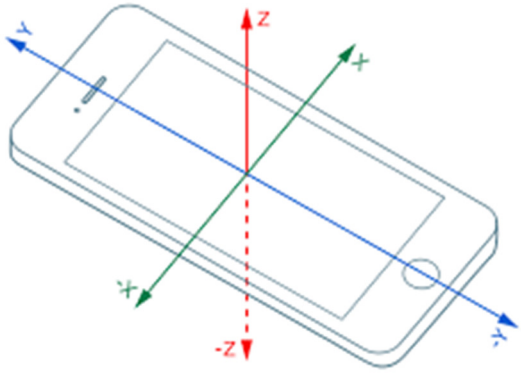
Independent Claim 1 of the '558 Patent, shown in italics, recites:

> *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 OBD and Wired Trackers are devices each with wireless communication ("the WCD") using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify *x*, *y*, and *z* axis accelerations (*i.e.*, vibrations and movements), of vehicles ("the mobile thing") it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) ("the motion activity") accurately. Trackem

technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky driving behaviors.

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



Each of the OBD and Wired Tracker devices uses 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, each Tracker device uses 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;*

Each of Defendant's OBD and Wired Tracker devices 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, each Tracker device 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. Each Tracker device 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*

Each Tracker device 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 each Tracker device 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.

36.

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.*

Each of Defendant's OBD and Wired Tracker devices uses accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. Because OBDII port orientation varies from one vehicle to the next, and moreover the vehicles orientation is not static, accelerometer

orientation is an unknown variable; accordingly each Tracker device 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).

37.

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, each of the OBD and Wired Tracker devices 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 device (multiple times per second).

38.

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.*

Each of the OBD and Wired Tracker devices uses 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, each Tracker device 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.

39.

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, each of the OBD and Wired Tracker devices processes accelerometer *x*, *y* and *z* axis data in a frequency domain (FD) to determine at least part of the motion activity. Each Tracker device uses Fast Fourier Transform (FFT) to convert the 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. Each Tracker device 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 movements.

40.

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, each of the OBD and Wired Tracker devices uses a list of motion activities such as driving, riding, fast acceleration or hard braking, and fast/sharp cornering.

41.

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, each of the OBD and Wired Tracker devices uses a list of motion activities such as driving, riding, fast acceleration or hard braking, and fast/sharp cornering. 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.

42.

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, each of the OBD and Wired Tracker devices uses a list of motion activities such as driving, riding, fast acceleration or hard braking, and fast/sharp cornering. 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.

43.

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, each of the OBD and Wired Tracker devices 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.

44.

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 OBD and Wired Tracker devices measures acceleration by magnitude and time to determine motion activities such as driving, riding, fast acceleration or hard braking, and fast/sharp cornering.

45.

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, each of the OBD and Wired Tracker devices processes accelerometer *x*, *y* and *z* axis data in a frequency domain (FD) to determine at least part of the motion activity. Each Tracker device uses Fast Fourier Transform to convert the 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. Each Tracker device 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 movements.

46.

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, each of the OBD and Wired Tracker devices measures acceleration by magnitude and time to determine motion activities such as driving, riding, fast acceleration or hard braking, and fast/sharp cornering. The frequency domain (FD) may be updated by analysis over time and used to determine the motion activity.

47.

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, each of the OBD and Wired Tracker devices 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. Moreover, Defendant engages in the promotion and sale of driver behavior tracking systems encompassing computing devices equipped with accelerometers and other sensors that communicate and or connect to other devices. Devices can be linked within Trackem packages and or solutions to other sensors, cameras, gateways, applications, fleet management software, and backend servers/services. One or more of these systems may be part of the telematics technologies and services as described in claim 1.

48.

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, each of the OBD and Wired Tracker devices identifies a motion activity (normal driving and dangerous driving, such as sharp cornering, et cetera) by computing a score related to an activity match, and when close, the activity is determined.

49.

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.*

Each of the OBD and Wired Tracker devices 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.

50.

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, each of Defendant's OBD and Wired Tracker devices 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.

51.

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

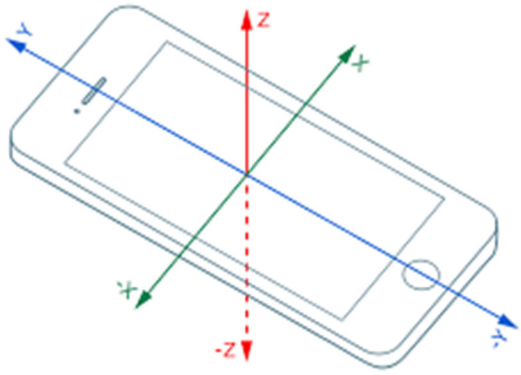
> *17. A method, comprising: receiving first and second data from one or more sensors associated with a wireless communication device (WCD) transported by a mobile thing (MT), the first and second data indicative of movement of the WCD;*

Each of Defendant's OBD and Wired Tracker devices uses wireless communication devices for determining human activities including when users are driving vehicles, riding in vehicles (not driving), when users are aggressively 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, each Tracker device uses accelerometer and/or gyroscope sensors for monitoring three streams of data ("the *x*, *y*, and *z* axis") from each device. Each of the OBD and Wired Tracker devices 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).

Each of the OBD and Wired Tracker devices measures acceleration of the vehicle 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;*



Each of the OBD and Wired Tracker devices 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). This first data determines at least the gravity's influences, so one or more subsequent data comparisons are void of non-device movements.

> *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, each of the OBD and Wired Tracker devices can accurately determine potentially critical events such as rapid accelerations and hard braking.

52.

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.*

Each of the OBD and Wired Tracker devices uses accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. Accelerometer orientation is dynamic; therefore each of the Tracker devices 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).

53.

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.*

Each of the OBD and Wired Tracker devices uses accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. Because accelerometer orientation is dynamic and not a given variable, each of the Tracker devices 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).

54.

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.*

Each of the OBD and Wired Tracker devices uses 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.

55.

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, each of the OBD and Wired Tracker devices identifies a motion activity (normal driving and dangerous driving, such as sharp cornering, et cetera) by monitoring and computing the magnitudes of the data in a two dimension time domain. Each of the Tracker devices uses Fast Fourier Transform to convert the 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. Each Tracker device 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 movements.

56.

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, each of Defendant's OBD and Wired Tracker devices measures acceleration by magnitude and time to determine motion activities such as fast acceleration, hard braking, and fast/sharp cornering. 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, each of the Tracker devices uses statistical metrics that is collected over time, to update motion activity data for matching.

57.

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, each of Defendant's OBD and Wired Tracker devices identifies a motion activity (normal driving and dangerous driving, such as sharp cornering, et cetera) by computing a score related to an activity match, and when close the activity is determined.

58.

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, each of Defendant's OBD and Wired Tracker devices 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. Moreover, Defendant engages in the promotion and sale of driver behavior tracking systems encompassing computing devices equipped with accelerometers and other sensors that communicate and or connect to other devices. Devices can be linked within Trackem packages and or solutions to other sensors, cameras, gateways,

applications, fleet management software, and backend servers/services. One or more of these systems may be part of the telematics technologies and services as described in claim 17.

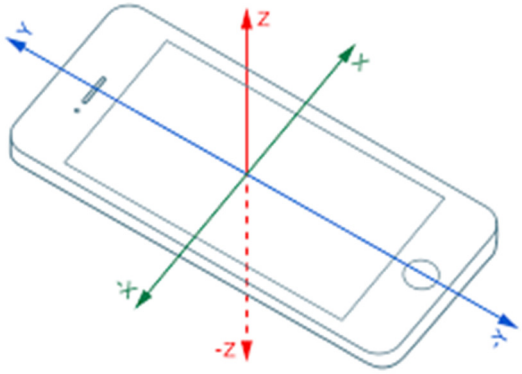
59.

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:*

The OBD and Wired Trackers are devices each with wireless communication ("the WCD") using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify x, y, and z axis accelerations (i.e., vibrations and movements), of vehicles ("the mobile thing") it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) ("the motion activity") accurately. Trackem technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky 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;*



Each of the OBD and Wired Tracker devices collects and processes accelerometer sensor data from three-axis accelerometers and/or three-axis gyroscopes to accurately identify user

events/activities such as hard braking, accelerations, and fast cornering. This advanced technology continuously monitors the device movement via the accelerometer and/or 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*

Each of the Tracker devices 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 ($g \approx 9.81\ m/s^2$).

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

By comparing the device 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.

60.

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.*

Each of the OBD and Wired Tracker devices uses 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, each device first determines the vertical direction, then a second horizontal direction is determined by rotating the vector for measuring forward/backwards and fast cornering through acceleration on a horizontal plane.

61.

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.*

Each of the OBD and Wired Tracker devices uses accelerometer *x*, *y* and *z* axis, the gyroscope *x*, *y*, and *z* axis, magnatometer, touch screen, and/or GPS data samples for determining at least part of the motion activities.

62.

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.*

Each of the OBD and Wired Tracker devices uses the accelerometer *x*, *y* and *z* axes and/or the gyroscope *x*, *y*, and *z* axes for determining at least part of the motion activities.

63.

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.*

Each of the OBD and Wired Tracker devices uses the 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.

64.

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, each of Defendant's OBD and Wired Tracker devices 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.

65.

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.*

Each of the OBD and Wired Tracker devices uses reference data to match sensor data that corresponds to Earth's gravity.

66.

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, each of the OBD and Wired Tracker devices processes accelerometer *x*, *y* and *z* axis data in a frequency domain (FD) to determine at least part of the motion activity. Each device 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 movements.

67.

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, each of the OBD and Wired Tracker devices 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. Each of the Tracker devices uses

Fast Fourier Transform to convert the 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. Each of the OBD and Wired Tracker devices 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 movements.

68.

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:*

Each of Defendant's OBD and Wired Tracker devices uses computer code stored in a memory and executed by a 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, each of the OBD and Wired Tracker devices monitors the accelerometer and/or gyroscope three streams of data ("the *x*, *y*, and *z* axis") from each device. The software of each device monitors the accelerometer sensor for linear acceleration and the gyroscope sensor for angular velocity to determine human activities (from sensor data), when users drive aggressively/dangerously by making sharp/fast turns, use hard braking, and accelerate too fast. Accelerometers are sensors which measure acceleration, the change in velocity over time. The programs measure acceleration of the vehicle 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 vehicle movements are dynamic, OBDII port orientation varies, and therefore the accelerometer's orientation is not a given, each of the devices 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, each of the OBD and Wired Tracker devices 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.*

Each of the OBD and Wired Tracker devices determines when users drive aggressively/dangerously by making sharp/fast turns, use hard braking, and accelerate too fast.

69.

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.*

Each of the OBD and Wired Tracker devices uses accelerometer *x*, *y* and *z* axis data to determine and recognize the direction of Earth's gravity. Accelerometer orientation is dynamic; therefore

each device 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.

70.

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.*

Each of the OBD and Wired Tracker devices automatically updates the orientation and the *x*, *y* and *z* axis data as the accelerometer orientation changes, so the vertical and/or horizontal measurements may be made.

71.

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, each of the OBD and Wired Tracker devices 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 movements, driving, braking, fast acceleration, and other motion activities may be accurately determined and measured.

72.

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, each of the OBD and Wired Tracker devices processes accelerometer *x*, *y* and *z* axis data in a frequency domain (FD) to determine at least part of the motion activity. Each of the devices 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 movements.

73.

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, each of the OBD and Wired Tracker devices 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.

74.

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:*

Each of the OBD and Wired Tracker is a device with wireless communication ("the WCD") using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify x, y, and z axis accelerations (i.e., vibrations and movements), of

vehicles ("the mobile thing") it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) ("the motion activity") accurately. Trackem technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky driving behaviors. Each of the devices uses computer code stored in a memory and executed by a processor.

> *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;*

Each of the OBD and Wired Tracker devices 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. Trackem's code accurately measures advanced movement with sensor data by identifying gravity (non-movement data) for accurate comparisons. The code allows for the collection of data sample values from the *x*, *y*, and *z* axes of accelerometers and gyroscopes sensors. With predefined timed lengths, the code is measured in at least first and second data samples. The first set of data includes gravity influences, but the system is able to distinguish non-movement influences (like gravity) and or the positioning of the device in the second set of movement data.

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

Each of the OBD and Wired Tracker devices includes code that defines how reference data for hard braking, fast acceleration, and fast cornering will be compared to actual movements/acceleration. Each device includes code that determines a vertical and/or horizontal framework so the reference data may used in determining when hard braking, fast acceleration, and fast cornering occur. The code determines a frequency, time length, block, and or data group for the first data.

> *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 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. The code normalizes the second data to the reference data, so that the second data my be analyzed in the reference framework.

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

Each of the OBD and Wired Tracker devices includes code that identifies motion activity, safe/unsafe styles of driving (hard braking/fast acceleration) based on the normalized data.

75.

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.*

Each of the OBD and Wired Tracker devices continually compares a plurality of accelerometer and/or gyroscope data samples.

76.

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.*

Each of the OBD and Wired Tracker devices uses the earth’s gravity to determine how to measure raw data against reference data.

77.

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, each of the OBD and Wired Tracker devices uses the earth's gravity to determine a magnitude and direction numbers (vector) for comparing a predefined numerical range.

78.

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, each of the OBD and Wired Tracker devices measures acceleration of the vehicle in time-segments, using first, second, et cetera, to confirm multiple time-segment matches to confirm most human activities.

79.

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, each of the OBD and Wired Tracker devices uses a discrete wavelet transform to convert data to time-frequency domain from time domain. Each of the devices processes the accelerometer *x*, *y* and *z* axis data in a two dimensional space for statistical metrics, including magnitudes of a motion activity.

80.

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, each of the OBD and Wired Tracker devices 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.

81.

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.*

Each of the OBD and Wired Tracker devices determines when a vehicle 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).

82.

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, each of Defendant's OBD and Wired Tracker devices 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. Moreover, Defendant engages in the

promotion and sale of driver behavior tracking systems encompassing computing devices equipped with accelerometers and other sensors that communicate and or connect to other devices. Devices can be linked within Trackem packages and or solutions to other sensors, cameras, gateways, applications, fleet management software, and backend servers/services. One or more of these systems may be part of the telematics technologies and services as described in claim 42.

83.

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.*

When each of the OBD and Wired Tracker devices includes code that determines a particular motion activity; the identified motion activity will cause it to monitor for a different motion based activity, such as once vehicle motion is determined, it will monitor and report on hard braking, fast acceleration, aggressive cornering, et cetera.

84.

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

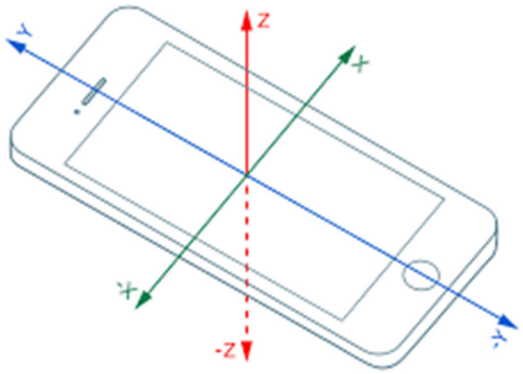
> *52. A system for implementation in a wireless communication device (WCD) that is designed to detect a plurality of mobile thing motion activities (MTMAs) associated with a mobile thing (MT), comprising: one or more memories designed to store computer program code; one or more processors designed to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

Each of the OBD and Wired Tracker is a device with wireless communication (“the WCD”) using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify x, y, and z axis accelerations (i.e., vibrations and movements), of vehicles (“the mobile thing”) it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) (“the motion activity”) accurately. Trackem

technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky driving behaviors. Each of the devices uses code stored in a memory and executed by a processor to monitoring linear acceleration and angular velocity for determining human activities.

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;*



Each of the OBD and Wired Tracker devices 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 that are indicative of movement of the device. The application receives updated data from the accelerometer(s), gyroscope(s), and/or other sensors that is representative of the movements.

> *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;*

Each of the Tracker devices 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, each device 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.

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

Each of the OBD and Wired Tracker devices includes code that computes movement data based upon the reference data and samples of live data. Each of the Tracker devices 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.*

Each of the OBD and Wired Tracker devices includes code that identifies motion activity (*e.g.* hard braking/fast acceleration) based on the normalized data. Each device includes code that identifies the motion activity such as unsafe driving based on the accelerometer and/or gyroscope movement data.

85.

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.*

Each of the OBD and Wired Tracker devices 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.

86.

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.*

Each of the OBD and Wired Tracker devices uses data sample values from accelerometer's and/or gyroscope's the *x*, *y* and *z* axes.

87.

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.*

Each of the OBD and Wired Tracker devices uses accelerometers sensors for monitoring linear acceleration and gyroscopes sensors for monitoring angular velocity over time periods for determining human activities.

88.

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.*

Each of the OBD and Wired Tracker devices uses the global positioning system (GPS) receiver to determine vehicle speed, when speed limits are exceeded, and location.

89.

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, each of the OBD and Wired Tracker devices determines a score from each data sample through a measurement of the time domain and frequency domain. Each of the

Tracker devices 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.

90.

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.*

Each of the OBD and Wired Tracker devices subtracts earth's gravity influence from the raw accelerometer data so the reference data may accurately represent the motion activity.

91.

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.*

Each of the OBD and Wired Tracker devices 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.

92.

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.*

Each of the OBD and Wired Tracker devices 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 '914 PATENT

93.

Plaintiff incorporates by reference the allegations of Paragraphs 1-16.

94.

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 OBD and Wired Tracker devices and systems automatic programs for monitoring human activities while driving.

95.

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:*

Each of the OBD and Wired Tracker is a device with wireless communication ("the WCD") using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify x, y, and z axis accelerations (i.e., vibrations and movements), of vehicles ("the mobile thing") it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) ("the motion activity") accurately. Trackem technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky driving behaviors. Each of Defendant's OBD and Wired Tracker devices uses computer code ("the application") stored in a memory and executed by a processor.

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

Each of the OBD and Wired devices uses logical monitoring techniques to assess the range or likelihood of events in verifying user activities and surroundings through repeated patterns, frequencies and or spikes. This enables the identification and confirmation of user movements.

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

On information and belief, each of the OBD and Wired devices uses logic to determine when the vehicle starts to move, when risky driver behaviors are determined, and for detecting other events such as idling. These events are reported from surveillance modes. The device has an audible sound and also sends aggressive driving violations to fleet managers.

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

On information and belief, each of the OBD and Wired devices uses logic to detect when driving aggressively by cornering, hard braking, fast accelerations, et cetera. The device sends a message to the fleet management system of the violation; this also triggers a message to smartphones from the server and allows the driver to see the logged events within their driver scorecard. The driver may review and respond to the driver score cards and the detailed information for each event.

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

On information and belief, each of the OBD and Wired devices communicates surveillance information (driver habits, 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 and/or third parties.

96.

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 OBD and Wired Trackers are devices each with wireless communication ("the WCD") using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify x, y, and z axis accelerations (i.e., vibrations and movements), of vehicles ("the mobile thing") it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) ("the motion activity") accurately. Trackem technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky driving behaviors. Each of Defendant's OBD and Wired Tracker devices uses computer code ("the application") stored in a memory and executed by a processor.

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

Each of the OBD and Wired device uses logic when the devices monitors movements for determining driving surveillance mode by knowing when it starts, idling occurs and ends (start/during/end of routes). Surveillance modes that capture location, driver's behavior alerts, video if applicable, and the range/amount of acceleration, braking, cornering and pre/post accident data are captured.

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

On information and belief, each of the OBD and Wired device uses logic to detect when driving aggressively by cornering, hard braking, fast accelerations or has an accident. The device sends a message to the fleet management system of the violation, which also triggers a message to smartphones from the server and allows the driver to see the logged events within their driver scorecard. The driver may review and respond to the driver score cards and the detailed information for each event.

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

On information and belief, each of the OBD and Wired device communicates surveillance information such as unsafe driving behaviors to remote servers for logging events and engaging additional actions.

COUNT IV

DIRECT INFRINGEMENT OF THE '273 PATENT

97.

Plaintiff incorporates by reference the allegations of Paragraphs 1-16.

98.

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 OBD and Wired Tracker devices and systems automatic programs for monitoring human activities while driving.

99.

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 OBD and Wired Trackers are devices each with wireless communication ("the WCD") using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify x, y, and z axis accelerations (i.e., vibrations and movements), of vehicles ("the mobile thing") it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) ("the motion activity") accurately. Trackem technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky driving behaviors.

> *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;*

Each of the OBD and Wired Tracker devices 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, each of the OBD and Wired Tracker devices computes reference data including a numeric magnitude and frequency over a predetermined time period. Raw accelerometer data that represents the acceleration of the device 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, each of the OBD and Wired Tracker devices 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 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 the vehicle motion activity such as fast acceleration/hard braking.

100.

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.*

Each of the OBD and Wired Tracker devices effectively determines gravity by combining reference sets of data from two or more axes of the accelerometer, that in combination have a magnitude value that equals earths gravity.

101.

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.*

Each of the OBD and Wired Tracker devices 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.

102.

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.*

Each of the OBD and Wired Tracker devices 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*.

103.

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.*

Each of the OBD and Wired Tracker devices 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 (*e.g.*, fast cornering) may at least be in part determined based on FD statistical metrics.

104.

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, each of the OBD and Wired Tracker devices uses a list of reference motion activities, each having a unique numeric score to be used for matching.

105.

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, each of the OBD and Wired Tracker devices uses a list of reference motion activities, each having a unique numeric score that can be matched with accelerometer data coming from motion activities.

106.

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.*

Each of the OBD and Wired Tracker devices uses a rotation matrix to normalize non-reference data sample values in relation to Earth gravity. This matrix allows motion activities to be determined without gravity influences that accelerometers inherently measure.

107.

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.*

Each of the OBD and Wired Tracker devices 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.

108.

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, each of the OBD and Wired Tracker devices transforms magnitudes from the time domain to the frequency domain, computing statistical metrics from the frequency domain data, and determining motion activities based on these statistical metrics.

109.

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.*

Each of the OBD and Wired Tracker devices implements one or more steps of the method in the wireless communication device, including processing of raw sensor data.

110.

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;*

Each of the OBD and Wired Tracker is a device with wireless communication ("the WCD") using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify x, y, and z axis accelerations (i.e., vibrations and movements), of vehicles ("the mobile thing") it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) ("the motion activity") accurately. Trackem technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky driving behaviors.

Claim 12 continues:

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

Each of the OBD and Wired Tracker devices uses reference data that determines peaks (and up and down) (2D) inertia motions by the accelerometer. Each of the Tracker devices 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.*

Each of the OBD and Wired Tracker devices identifies motion activity based upon accelerations that exclude gravity measurements (*i.e.*, the normalized second data).

111.

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.*

Each of the OBD and Wired Tracker devices 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.

112.

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.*

Each of the OBD and Wired Tracker devices 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.

113.

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.*

Each of the OBD and Wired Tracker devices 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.

114.

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.*

Each of the OBD and Wired Tracker devices 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. Each

device 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.

115.

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.*

Each of the OBD and Wired Tracker devices uses the second data as its represented in the time domain (TD). To identify MTMA, 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.

116.

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, each of the OBD and Wired Tracker devices 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.

117.

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;*

Each of the OBD and Wired Tracker is a device with wireless communication ("the WCD") using a processor, cache and other memory, cellular and or Bluetooth communication and accelerometers to identify x, y, and z (*i.e.*, 3D) axis accelerations (i.e., vibrations and movements), of vehicles ("the mobile thing") it's carried by, to monitor, capture, and report driver behavior (such as harsh acceleration, braking, turning, idling time) ("the motion activity") accurately. Trackem technology surpasses traditional location tracking systems by employing accelerometer sensors to precisely identify risky driving behaviors.

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;*

Each of the OBD and Wired Tracker devices uses reference data 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.

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

Each of the OBD and Wired Tracker devices 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.

118.

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.*

Each of the OBD and Wired Tracker devices 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 device 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 ’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 24, 2024

/s/ Brett Thomas Cooke

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