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(54) **Title:** GENERATING PREDICTIVE INFORMATION ASSOCIATED WITH VEHICLE PRODUCTS/SERVICES

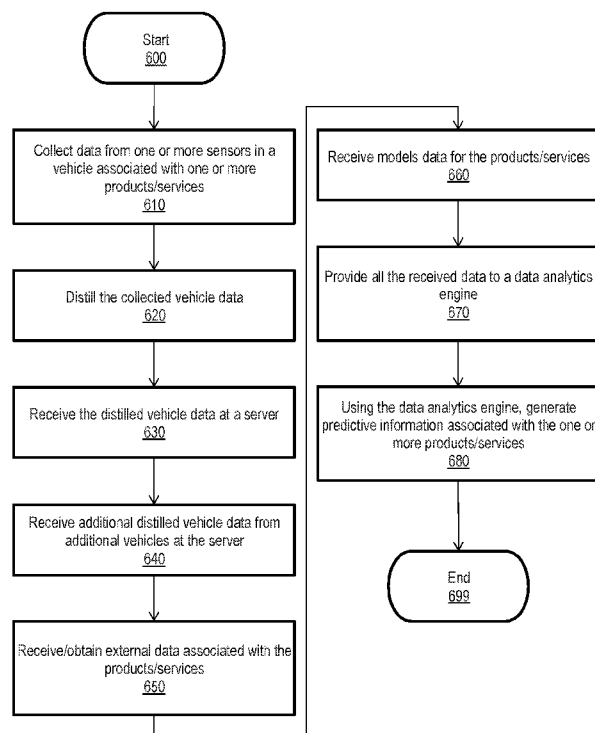


Fig. 6

(57) **Abstract:** Methods and systems include receiving vehicle data that is associated, at least in part, with one or more vehicle-related products/services. One or more predictions that are associated with the one or more vehicle-related products/services are determined. The one or more predictions are based, at least in part, on the vehicle data.



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Generating Predictive Information Associated with Vehicle Products/Services

A. Background

[¶1] The invention relates generally to the field of vehicle technology.

B. Brief Description of the Drawings

[¶2] Other objects and advantages of the invention may become apparent upon reading the detailed description and upon reference to the accompanying drawings.

[¶3] Figure 1 is a diagram illustrating a system configured to predict information associated with vehicle products/services, in accordance with some embodiments.

[¶4] Figure 2 is a diagram illustrating an alternative system configured to predict information associated with vehicle products/services, in accordance with some embodiments.

[¶5] Figure 3 is a diagram illustrating a system configured to create and/or improve products/services models associated with one or more vehicle products/services, in accordance with some embodiments.

[¶6] Figure 4 is a diagram illustrating a vehicle and a server configured to predict information associated with vehicle products/services, in accordance with some embodiments.

[¶7] Figure 5 is a flow diagram illustrating a method for predicting information associated with vehicle products/services, in accordance with some embodiments.

[¶8] Figure 6 is a flow diagram illustrating an alternative method for predicting information associated with vehicle products/services, in accordance with some embodiments.

[¶9] Figure 7 is a flow diagram illustrating a method for creating and/or improving products/services models associated with vehicle products/services, in accordance with some embodiments.

[¶10] Figure 8 is a flow diagram illustrating an alternative method for creating and/or improving products/services models associated with vehicle products/services, in

accordance with some embodiments.

[¶11] While the invention is subject to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and the accompanying detailed description. It should be understood, however, that the drawings and detailed description are not intended to limit the invention to the particular embodiments. This disclosure is instead intended to cover all modifications, equivalents, and alternatives falling within the scope of the present invention as defined by the appended claims.

C. Detailed Description

[¶12] Figure 1 is a diagram illustrating a system configured to predict information associated with vehicle products/services, in accordance with some embodiments.

[¶13] In some embodiments, vehicle 110 is configured to collect vehicle data 120. Vehicle data 120 may contain information associated with one or more vehicle-related products/services. Vehicle data 120 may be provided to data analytics engine 130 for processing. In some embodiments, data analytics engine 130 may be configured to generate predictive information 140 that is associated with vehicle data 120 and/or the one or more products/services. It should be noted that vehicle data may be received from multiple vehicles/drivers and merged together by data analytics engine 130.

[¶14] Generally, vehicle data 120 may include data from one or more sensors on a vehicle, as well as other vehicle data that may be associated with the one or more products/services such as vehicle identification details (make, model, miles, age, etc.), vehicle diagnostics data, and vehicle history. In some embodiments, vehicle data 120 may also be correlated with other types of data, such as map data and date/time data, for example.

[¶15] In some embodiments, external data 180 may also be provided to data analytics engine 130. External data 180 may be related to the one or more products/services and may be data received from one or more external sources other than the vehicle(s). In some

embodiments, external data 180 may include map-based data such as weather information, road functional class, conditions of various segments of the road, construction areas, road curvature, altitude maps, typical average speeds of various road segments, reported incidents, etc. External data may generally include examples such as those discussed in relation to other figures here.

[¶16] In some embodiments, certain types of data may be received as both external data 180 and vehicle data 120. For example, weather data may be received as external data from a weather prediction service and may also be received from a vehicle as the weather data may be detected by one or more sensors on the vehicle.

[¶17] Vehicle data 120 may include data on chassis conditions, chassis settings, various engine metrics, etc. Vehicle data 120 may also include data related to a driver's personal driving style. Such data may include g-vehicle data (indicating acceleration, in some embodiments, in all three directions), accelerator pedal input, brake pedal input, (optionally, clutch pedal input), steering input, gear shifting input, mode choices (sport mode, racing mode, city driving mode, etc.), etc.

[¶18] In some embodiments, vehicle data may also include various details about the specific vehicle, such as the vehicle year, make, model, trim, extra options, number of miles, etc. In addition, vehicle data may include general information about the driver or drivers of a specific vehicle. For example, vehicle data may include information identifying the current driver, the driver's sex, age, and other personal information that may influence or identify a driver's driving style.

[¶19] Another type of vehicle data 120 may be weather data. Such data may include temperature, humidity, altitude (barometric pressure), rainfall, etc. It should be noted that weather data may be provided from sensors on the vehicle and/or as external data (which may also include historical weather data).

[¶20] Yet another type of vehicle data 120 provided may be road conditions. Such data may

include road functional class, road surface type, road surface condition, amount of turns and general curvature, altitude, average driving speeds (which may be obtained across multiple drivers and cars), road in the city or highway, reported road incidents history and characteristics (such as potholes, ice, snow, mud, etc.), etc. Road condition data may again be provided from sensors on the vehicle and/or as external data 180. For example, such external data may be obtained from regional government roadway-management agencies. Vehicle data may generally include examples as those discussed in relation to other figures here.

[¶21] In some embodiments, data analytics engine 130 may be implemented using various methods. Data analytics engine may, utilize, for example simple curve-fitting methods, neural networks, forms of artificial intelligence, etc.

[¶22] In some embodiments, predictive information 140 may include any information that may be learned and predicted by data analytics engine 130 when data analytics engine 130 is provided with vehicle data 120 and/or external data 180. Generally, predictive information 140 may include information related to products/services that can be provided for the vehicle and/or for the vehicle's driver.

[¶23] It should be noted that, in some embodiments, vehicle data may be obtained from multiple vehicles as well as multiple drivers. In such embodiments, data analytics engine 130 may be configured to combine/correlate the data from the multiple vehicles and drivers. For example, road data from multiple vehicles may be combined and averaged in order to determine road conditions for specific road segments.

[¶24] In some embodiments, the predictive information, based at least in part on provided vehicle data 120 and/or external data 180, may include products/services recommendations that are personalized to a particular driver/vehicle. Such personalized recommendations may include optimum equipment replacements and/or upgrades given the particular driver, vehicle, driving conditions/style, etc. For example, data analytics engine 130 may be configured to determine optimum replacements for

brakes, tires, engine oil, transmission oil, oil filter, air filter, spark plugs, fuel type, windshield wipers, wax, external protective coatings, bull bars, road debris shields, mud flaps, etc.

[¶25] In some embodiments, data analytics engine 130 may be configured to generate upgrade recommendations. For example, if the data analytics engine 130 predicts that the driver of a specific vehicle could benefit from more performance, a better engine-mapping unit, a better turbo charger, or the addition of a supercharger may be recommended.

[¶26] In some embodiments, data analytics engine 130 may be configured to recommend specific service providers, based at least in part on the provided information. For example, if data analytics engine 130 determines that performance upgrades are needed/appropriate, a suitable high-performance shop may be recommended. Alternatively, if the vehicle requires only routine maintenance, such as an oil change, an inexpensive oil-change shop may be recommended.

[¶27] In some embodiments, certain recommendations/predictive information may be given higher ranking based on other reasons. For example, a certain brake manufacturer may provide incentives in order for brakes made by that manufacturer to be given a higher ranking in the generated predictive information.

[¶28] Figure 2 is a diagram illustrating an alternative system configured to predict information associated with vehicle products/services, in accordance with some embodiments.

[¶29] In some embodiments, vehicle 210 is configured to collect vehicle data 250. Vehicle data 250 may contain information associated with one or more vehicle-related products/services. Vehicle data 250 may then be provided to data analytics engine 230 for processing. In some embodiments, data analytics engine 230 may be configured to generate predictive information 240 that is associated with vehicle data 250.

[¶30] Generally, vehicle data 250 may include data from sensors on the vehicle as well as

other vehicle data (such as environmental data, vehicle history, etc.). Such vehicle data may include weather data, road conditions, personal driving style data, vehicle chassis conditions, wear indicators for several parts, etc. Other examples of vehicle data may include data from on-board RADAR, LIDAR, cameras, ultrasonic sensors, GNSS, accelerometers, ABS/ESC sensors, and other vehicle environmental sensors. Vehicle data may also include derivative data that results from the fusion of the sensor data (from any vehicle sensors) and potentially other on-board vehicle data, such as map data or date/time data. For example, various data from on-board sensors may be correlated and associated with the map data and/or with the date/time data. Vehicle data may generally include examples such as those discussed in relation to other figures here.

[¶31] In some embodiments, data analytics engine 230 may be implemented using various methods. Data analytics engine may utilize simple curve-fitting methods, neural networks, or any other type of artificial intelligence methods.

[¶32] In some embodiments, external data 280 may also be provided to data analytics engine 130. External data 280 may be related to the one or more products/services and may be data received from one or more external sources other than the vehicle(s). In some embodiments, external data 280 may include map-based data such as road functional class, conditions of various segments of the road, construction areas, road curvature, altitude maps, typical average speeds of various road segments, reported incidents, etc. External data may generally include examples such as those discussed in relation to other figures here.

[¶33] In some embodiments, additional vehicle data from additional vehicles/drivers may be supplied to data analytics engine 230. In some embodiments, the additional data may be used by data analytics engine to enhance the predictive information with the information collected from the additional vehicles/drivers. Data with similar attributes may be combined (whether in a statistical manner, through neural networks, or otherwise) in order to enhance the predictions. Attributes may include the year, make, and model of the vehicle, the type of brakes on the vehicle, the type of tires on the

vehicle, etc. Attributes may also include driving conditions such as weather, road condition, traffic conditions, etc. In addition, attributes may also include specific information about the driver or drivers of each vehicle. Data analytics engine 230 may attribute relatively more significance to additional vehicle data from the same types, or a similar types, of vehicles/drivers. For example, such vehicles/drivers may include, but are not limited to: same or similar vehicle type (e.g., compact car with front-wheel drive, all-wheel drive sport sedan, roadster, SUV, electric vehicle, performance-oriented vehicle, vehicle optimized for high gas mileage, etc.), similar driving style (e.g., aggressive, relaxed, defensive, hypermiling, etc.), similar driving environment (e.g., environmental conditions, such as road conditions, weather conditions, etc.), and the like. As used herein, the phrase “substantially the same” is intended to mean the same, almost the same, approximately the same, or any combination or permutation of those intended meanings.

[¶34] In embodiments where multiple drivers share a vehicle, each set of the vehicle data may be associated with the driver’s identity and be used during the determination of the predictive information. For example, using data from a brake-wear sensor, it can be determined how much brake-wear per mile may be attributed to each driver, etc.

[¶35] In some embodiments, model server 260 may be configured to provide data analytics engine 230 with products/services models 270. Data analytics engine 230 is configured to combine products/services models 270 with vehicle data 250 and external data 280 in determining predictive information 240. In some embodiments, products/services models 270 may comprise collected and/or processed information about products and services that are being predicted by data analytics engine 230 and are related to the collected vehicle data 250.

[¶36] Generally, predictive information 240 may include information related to products/services that can be provided to the vehicle and/or the vehicle’s driver. In some embodiments, the predictive information, based at least in part on provided vehicle data 250, may include products/services recommendations that are personalized

to the driver/vehicle. Such personalized recommendations may include optimum equipment replacements, upgrade recommendations, service providers, etc.

[¶37] Products/services models 270 may include information that was previously collected and processed. For example, products/services models 270 may include performance information for products such as tires. Information on tires may include, for example, tire information such as wear patterns and other performance based on temperature, road surface, load, acceleration, etc. Other examples of such products/services models may include brakes, engine oil, transmission oil, oil filters, air filters, spark plugs, fuel, engine-mapping units, turbo chargers, superchargers, etc.

[¶38] Figure 3 is a diagram illustrating a system configured to create and/or improve products/services models associated with one or more vehicle products/services, in accordance with some embodiments.

[¶39] In some embodiments, vehicle 310 is configured to collect vehicle data 350, which contains information associated with one or more vehicle-related products/services. Vehicle data 350 may then be provided to data analytics engine 330 for processing. In some embodiments, data analytics engine 330 may be configured to generate predictive information 340 that is associated with vehicle data 350.

[¶40] Generally, vehicle data 350 may include data collected from one or more sensors on a vehicle. Vehicle data may include road conditions, personal driving style data, wear indicators, etc. Vehicle data may generally include examples as those discussed in relation to other figures here.

[¶41] In addition, data analytics engine 330 may also be configured to receive external data 380. External data 380 may include data that is related to the products/services, such as environmental data for example. External data may generally include examples such as those discussed in relation to other figures here.

[¶42] In some embodiments, data analytics engine 330 may be implemented using various

methods. Data analytics engine may utilize simple curve-fitting methods, neural networks, artificial intelligence methods, etc.

[¶43] In some embodiments, model server 360 may be configured to provide to data analytics engine 330 products/services models 370. Data analytics engine 330 may be configured to combine products/services models 370 with vehicle data 350 in determining predictive information 340.

[¶44] In some embodiments, products/services models 370 may comprise collected and/or processed information, related to vehicle data 350, that is being predicted by data analytics engine 330.

[¶45] Generally, predictive information 340 may include information related to products/services that can be provided to the vehicle and the vehicle's driver. In some embodiments, the predictive information, based at least in part on provided vehicle data 350, may include products/services recommendations that are personalized to the driver/vehicle. Such personalized recommendations may include optimum equipment replacements, upgrade recommendations, service providers, etc.

[¶46] Products/services models 370 may include information that was previously collected and processed. For example, products/services models 370 may include performance information for products such as tires. Information on tires may include, for example, wear patterns and other performance indicators that are based on temperature, road surface, load, acceleration, etc. Other examples of such products/services models may include brakes, engine oil, transmission oil, oil filters, air filters, spark plugs, fuel, engine-mapping units, turbo chargers, superchargers, etc.

[¶47] In some embodiments, data from the data analytics engine 330 may be used to provide feedback to model server 360 in order for model server 360 to improve products/services models 370. In some embodiments, if no model exists for a particular product or service, the model may be created for that particular product or service using

information/feedback received from data analytics engine 330. In other embodiments, information/feedback provided by services/product models 370 may be added to and improve products/services 370.

[¶48] In some embodiments, additional vehicle data from additional vehicles/drivers may be supplied to data analytics engine 330. In some embodiments, the additional data may be used by data analytics engine to enhance predictive information 340 with the information collected from the additional vehicles/drivers. Data with similar attributes may be combined (whether in a statistical manner, through neural networks, or otherwise) in order to enhance the predictions. Attributes may include the year, make, and model of the vehicle, the type of brakes on the vehicle, the type of tires on the vehicle, etc. Attributes may also include driving conditions such as weather, road condition, traffic conditions, etc. In addition, attributes may also include specific information about the driver or drivers of each vehicle.

[¶49] In embodiments where multiple drivers share a vehicle, each set of the vehicle data may be associated with the driver's identity and be used during the determination of the predictive information. For example, using data from a brake wear sensor, it can be determined how much brake wear can be attributed to each driver per mile, etc.

[¶50] In some embodiments, model server 360 may be configured to provide feedback information for improving sensors 310. The feedback information may be provided, for example, from the products/services models that were created and updated/improved at model server 360. In some embodiments, feedback provided by model server 360 may be used, for example, in choosing what type of sensors to set up on a vehicle, what type of data to collect from those sensors, how to distill the data before transmission, etc.

[¶51] Figure 4 is a diagram illustrating a vehicle and a server configured to predict information associated with vehicle products/services, in accordance with some embodiments.

[¶52] In some embodiments, vehicle 410 may include one or more processor units (such as

processor unit 450), one or more memory units (such as memory unit 455, which are coupled to processor unit 450), and one or more communications units (such as communications unit 460, which is also coupled to processor 450 and/or memory unit 455). In some embodiments, vehicle 410 may also include one or more sensors, such as sensors 430A-G.

[¶53] In some embodiments, sensors 430A-G are configured to collect information associated with one or more vehicle-related products/services. Vehicle data, which may include data other than the sensor data, may be provided to processor unit 450 and/or stored in memory unit 455. Processor unit 450 may be configured to preprocess the vehicle data before the vehicle data is transmitted to another location (such as server 470) for additional processing.

[¶54] In some embodiments, some preprocessing of the data may occur in order to distill the data to a smaller size prior to transmission. For example, there may be vehicle data obtained from two different sensors that contains the same or very similar information. In such a case, only data from one of the sensors may be sent. Additional types of pre-processing, such as general compression, may also be performed locally on the vehicle before the vehicle data is transmitted to server 470.

[¶55] In some embodiments, communications unit 460 is configured to establish a connection, either direct or indirect, with communications unit 490 of server 470. In some embodiments, server 470 may also include one or more processor units (such as processor unit 480), one or more memory units (such as memory unit 485, which is coupled to processor unit 480), and one or more communications units (such as communications unit 490, which is also coupled to processor 480 and/or memory unit 485).

[¶56] In some embodiments, server 470 may be configured to generate predictive information that is associated with the vehicle data received from vehicle 410. In some embodiments, server 470 may also be configured to receive external data 495 that may

include other data related to the vehicle data (such as environmental data).

[¶57] In some embodiments, server 470 may be configured to apply various methods in generating predictive information. For example, server 470 may utilize simple curve-fitting methods, neural networks, artificial intelligence methods, etc.

[¶58] In some embodiments, server 470 may be configured to store, generate, and/or update products/services models. In some embodiments, server 470 may be configured to combine products/services models with the vehicle data and the external data in determining the predictive information. In some embodiments, the products/services models may comprise collected and/or processed information about products and services that are being predicted by server 470 and are related to the vehicle data. In some embodiments, server 470 may be configured to improve the products/services models using the vehicle data and other external data provided to the server.

[¶59] Generally, the predictive information may include information related to products/services that can then be provided to the vehicle and the vehicle's driver. The information may be sent back to the vehicle or the information may be sent to a designated email address, phone number, dealership, service provider, retail store, etc.

[¶60] In some embodiments, the predictive information, based at least in part on the provided vehicle data, may include products/services recommendations that are personalized to the driver/vehicle. Such personalized recommendations may include optimum equipment replacements, upgrade recommendations, service providers, etc.

[¶61] The products/services models may include information that was previously collected and processed. For example, the products/services models may include performance information for products such as tires. Information on tires may include, for example, tire information such as wear patterns and other performance based on temperature, road surface, load, acceleration, etc. Other examples of such products/services models may include brakes, engine oil, transmission oil, oil filters, air filters, spark plugs, fuel, engine-mapping units, turbo chargers, superchargers, etc. In some embodiments,

server 470 may be configured to create and/or improve the products/services models using the information provided to server 470 (such as the vehicle data and the external data).

[¶62] In some embodiments, additional vehicle data from additional vehicles/drivers may be supplied to server 470. In some embodiments, the additional data may be combined with the other information provided to server 470 in order to enhance the generated predictive information and/or the products/services models.

[¶63] Figure 5 is a flow diagram illustrating a method for predicting information associated with vehicle products/services, in accordance with some embodiments.

[¶64] In some embodiments, the method described here may be performed by one or more of the systems described in Figures 1-4.

[¶65] Processing begins at 500 where, at block 510, collected vehicle data from a vehicle is received. In some embodiments, the collected data may be related to one or more products/services associated with a vehicle.

[¶66] At block 520, the received processed data is processed using a data analytics engine. In some embodiments, data analytics engine may be implemented using various methods. Data analytics engine may utilize simple curve-fitting methods, neural networks, artificial intelligence methods, etc.

[¶67] At block 530, the data analytics engine determines predictive information about the products/services associated with the received vehicle data.

[¶68] Processing subsequently ends at 599.

[¶69] Figure 6 is a flow diagram illustrating an alternative method for predicting information associated with vehicle products/services, in accordance with some embodiments.

[¶70] In some embodiments, the method described here may be performed by one or more of

the systems described in Figures 1-4.

[¶71] Processing begins at 600 where, at block 610, data is collected from one or more sensors on a vehicle. The vehicle data is associated with one or more vehicle-related products/services.

[¶72] At block 620, the collected vehicle data is distilled. In some embodiments, the vehicle data is reduced in size to better facilitate the transmission of the data. For example, duplicate data may be removed. Generally, a compression of the data may be performed.

[¶73] At block 630, the distilled vehicle data is received at a server where the vehicle data is to be combined with additional data and/or go through additional processing.

[¶74] At block 640, additional vehicle data from additional vehicles/drivers is received at the server. In some embodiments, the additional vehicle data further enhances the results determined at the server when the vehicle data is processed.

[¶75] At block 650, external data, associated with the one or more products/services, is received/obtained at the server. In some embodiments, external data may be any data that may enhance the results generated by the server that are associated with the products/services and/or the vehicle data.

[¶76] At block 660, models for the products/services are received at the server. In some embodiments, products/services models may include information that was previously collected and processed about the products/services. For example, the products/services models may include performance information for products such as tires, brakes, engine oil, transmission oil, oil filters, air filters, spark plugs, fuel, engine-mapping units, turbo chargers, superchargers, etc.

[¶77] Processing subsequently ends at 699.

[¶78] Figure 7 is a flow diagram illustrating a method for creating and/or improving

products/services models associated with vehicle products/services, in accordance with some embodiments.

[¶79] In some embodiments, the method described here may be performed by one or more of the systems described in Figures 1-4.

[¶80] Processing begins at 700 where, at block 710, collected vehicle data from a vehicle is received. In some embodiments, the vehicle data is associated with one or more vehicle-related products/services.

[¶81] At block 720, the received vehicle data is analyzed and processed, and at block 730, one or more models corresponding to the one or more products/services are determined. In some embodiments, products/services models may include information that was previously collected and processed. For example, the products/services models may include performance information for products such as tires, brakes, engine oil, transmission oil, oil filters, air filters, spark plugs, fuel, engine-mapping units, turbochargers, superchargers, etc.

[¶82] Processing subsequently ends at 799.

[¶83] Figure 8 is a flow diagram illustrating an alternative method for creating and/or improving products/services models associated with vehicle products/services, in accordance with some embodiments.

[¶84] In some embodiments, the method described here may be performed by one or more of the systems described in Figures 1-4.

[¶85] Processing begins at 800 where, at block 810, data is collected from one or more sensors in a vehicle associated with one or more vehicle-related products/services.

[¶86] At block 820, the collected vehicle data is distilled. In some embodiments, the vehicle data is reduced in size to better facilitate the transmission of the data. For example, duplicate data may be removed. Generally, a compression of the data may be

performed. At block 830, the distilled vehicle data is received at a server.

[¶87] At block 840, additional distilled data is received at the server from additional vehicles/drivers. In some embodiments, the additional vehicle data further enhances the results determined at the server when the vehicle data is processed.

[¶88] At block 860, external data associated with the one or more products/services is received/obtained at the server. In some embodiments, external data may be any data that may enhance the results generated by the server that are associated with the products/services and/or the vehicle data.

[¶89] At block 870, one or more products/services models are updated based at least upon the received data. In some embodiments, products/services models may include information that was previously collected and processed. For example, the products/services models may include performance information for products such as tires, brakes, engine oil, transmission oil, oil filters, air filters, spark plugs, fuel, engine-mapping units, turbo chargers, superchargers, etc.

[¶90] Processing subsequently ends at 899.

[¶91] One or more embodiments of the invention are described above. It should be noted that these and any other embodiments are exemplary and are intended to be illustrative of the invention rather than limiting. While the invention is widely applicable to various types of systems, a skilled person will recognize that it is impossible to include all of the possible embodiments and contexts of the invention in this disclosure. Upon reading this disclosure, many alternative embodiments of the present invention will be apparent to persons of ordinary skill in the art.

[¶92] The previous description of the disclosed embodiments is provided to enable any person skilled in the art to make or use the present invention. Various modifications to these embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without departing from

the spirit or scope of the invention. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

[¶93] The benefits and advantages that may be provided by the present invention have been described above with regard to specific embodiments. These benefits and advantages, and any elements or limitations that may cause them to occur or to become more pronounced are not to be construed as critical, required, or essential features of any or all of the claims. As used herein, the terms “comprises,” “comprising,” or any other variations thereof, are intended to be interpreted as non-exclusively including the elements or limitations that follow those terms. Accordingly, a system, method, or other embodiment that comprises a set of elements is not limited to only those elements, and may include other elements not expressly listed or inherent to the claimed embodiment.

[¶94] While the present invention has been described with reference to particular embodiments, it should be understood that the embodiments are illustrative and that the scope of the invention is not limited to these embodiments. Many variations, modifications, additions and improvements to the embodiments described above are possible. It is contemplated that these variations, modifications, additions and improvements fall within the scope of the invention as detailed within the following claims.

Claims

1. A method comprising:

receiving vehicle data from a vehicle and additional vehicle data from other vehicles, wherein the vehicle data is associated, at least in part, with one or more vehicle-related products/services;

receiving external data, wherein the external data is associated, at least in part, with the one or more vehicle-related products/services; and

determining one or more predictions associated with the one or more vehicle-related products/services, wherein the one or more predictions are based, at least in part, on the vehicle data, on the additional vehicle data, on the external data, and on one or more products/services models, wherein the one or more products/services models are associated, at least in part, with the one or more vehicle-related products/services and wherein the additional vehicle data is from other vehicles having substantially the same vehicle type, driven via substantially the same driving style, and in substantially the same driving environment as the vehicle.

2. The method of claim 1, wherein the vehicle data comprises at least one of: data collected by one or more sensors on a vehicle, and vehicle identification/history data.

3. The method of claim 1, wherein receiving vehicle data comprises receiving distilled vehicle data, wherein the distilled vehicle data is obtained by compressing the size of the vehicle data.

4. The method of claim 1, further comprising improving the one or more products/services models based, at least in part, on the vehicle data and on the external data.

5. The method of claim 1, wherein the determining comprises correlating data having

similar attributes.

6. A system comprising one or more processors coupled to one or more memory units, wherein the one or more processors are configured to:

receive vehicle data from a vehicle and additional vehicle data from other vehicles, wherein the vehicle data is associated, at least in part, with one or more vehicle-related products/services;

receive external data, wherein the external data is associated, at least in part, with the one or more vehicle-related products/services; and

determine one or more predictions associated with the one or more vehicle-related products/services, wherein the one or more predictions are based, at least in part, on the vehicle data, on the additional vehicle data, on the external data, and on one or more products/services models, wherein the one or more products/services models are associated, at least in part, with the one or more vehicle-related products/services and wherein the additional vehicle data is from other vehicles having substantially the same vehicle type, driven via substantially the same driving style, and in substantially the same driving environment as the vehicle.

7. The system of claim 6, wherein the vehicle data comprises at least one of: data collected by one or more sensors on a vehicle, and vehicle identification/history data.
8. The system of claim 6, wherein receiving vehicle data comprises receiving distilled vehicle data, wherein the distilled vehicle data is obtained by compressing the size of the vehicle data.
9. The system of claim 6, further comprising the one or more processors being configured to improve the one or more products/services models based, at least in part, on the vehicle data and on the external data.

10. The system of claim 6, wherein the determining comprises the one or more processors being configured to correlate data having similar attributes.
11. At least one non-transitory, machine-accessible storage medium having instructions stored thereon, wherein the instructions are configured, when executed on a machine, to cause the machine to:
 - receive vehicle data from a vehicle and additional vehicle data from other vehicles, wherein the vehicle data is associated, at least in part, with one or more vehicle-related products/services;
 - receive external data, wherein the external data is associated, at least in part, with the one or more vehicle-related products/services; and
 - determine one or more predictions associated with the one or more vehicle-related products/services, wherein the one or more predictions are based, at least in part, on the vehicle data, on the additional vehicle data, on the external data, and on one or more products/services models, wherein the one or more products/services models are associated, at least in part, with the one or more vehicle-related products/services and wherein the additional vehicle data is from other vehicles having substantially the same vehicle type, driven via substantially the same driving style, and in substantially the same driving environment as the vehicle.
12. The at least one storage medium of claim 11, wherein the vehicle data comprises at least one of: data collected by one or more sensors on a vehicle, and vehicle identification/history data.
13. The at least one storage medium of claim 11, wherein receiving vehicle data comprises receiving distilled vehicle data, wherein the distilled vehicle data is obtained by compressing the size of the vehicle data.
14. The at least one storage medium of claim 11, further comprising the instructions being configured to improve the one or more products/services models based, at

least in part, on the vehicle data and on the external data.

15. The at least one storage medium of claim 11, wherein the determining comprises the instructions being configured to correlate data having similar attributes.

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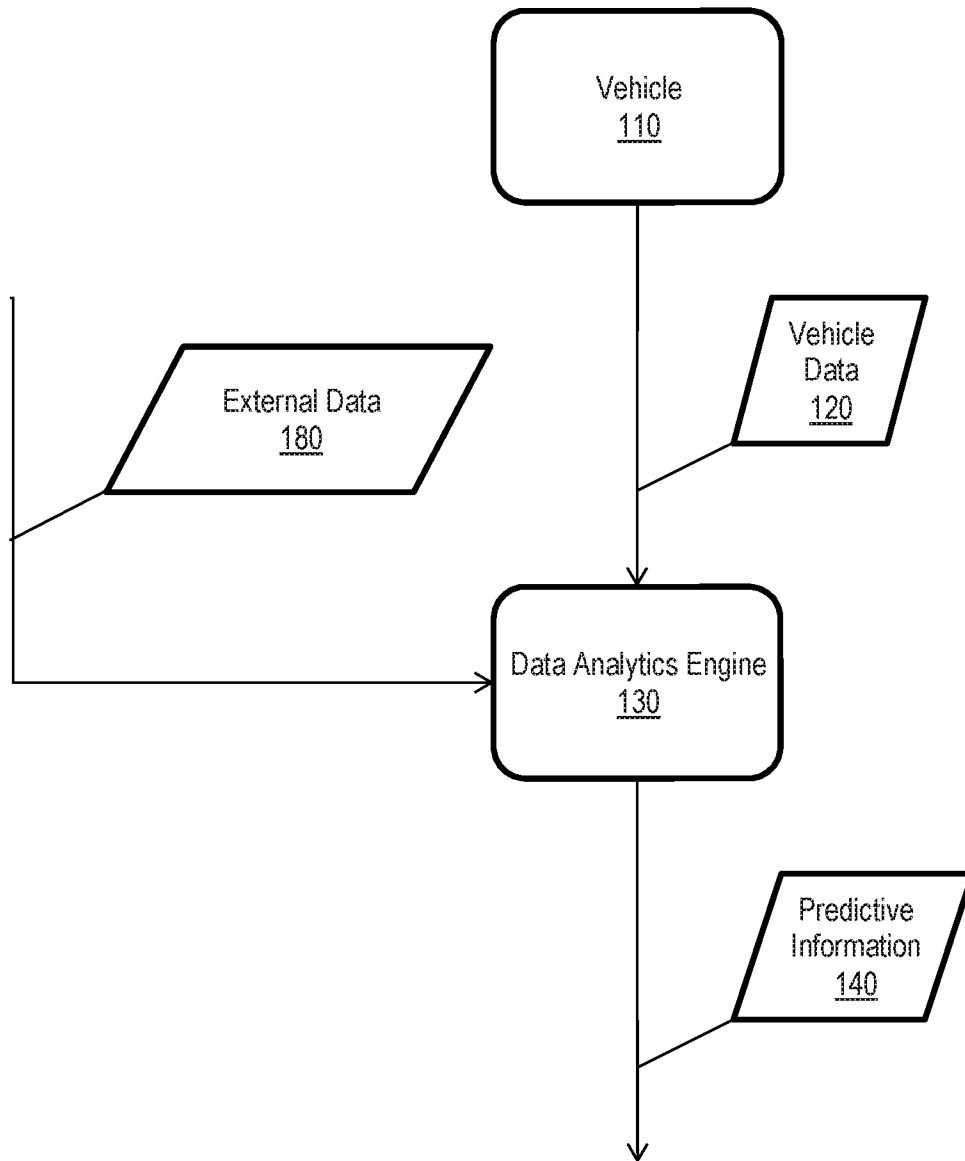


Fig. 1

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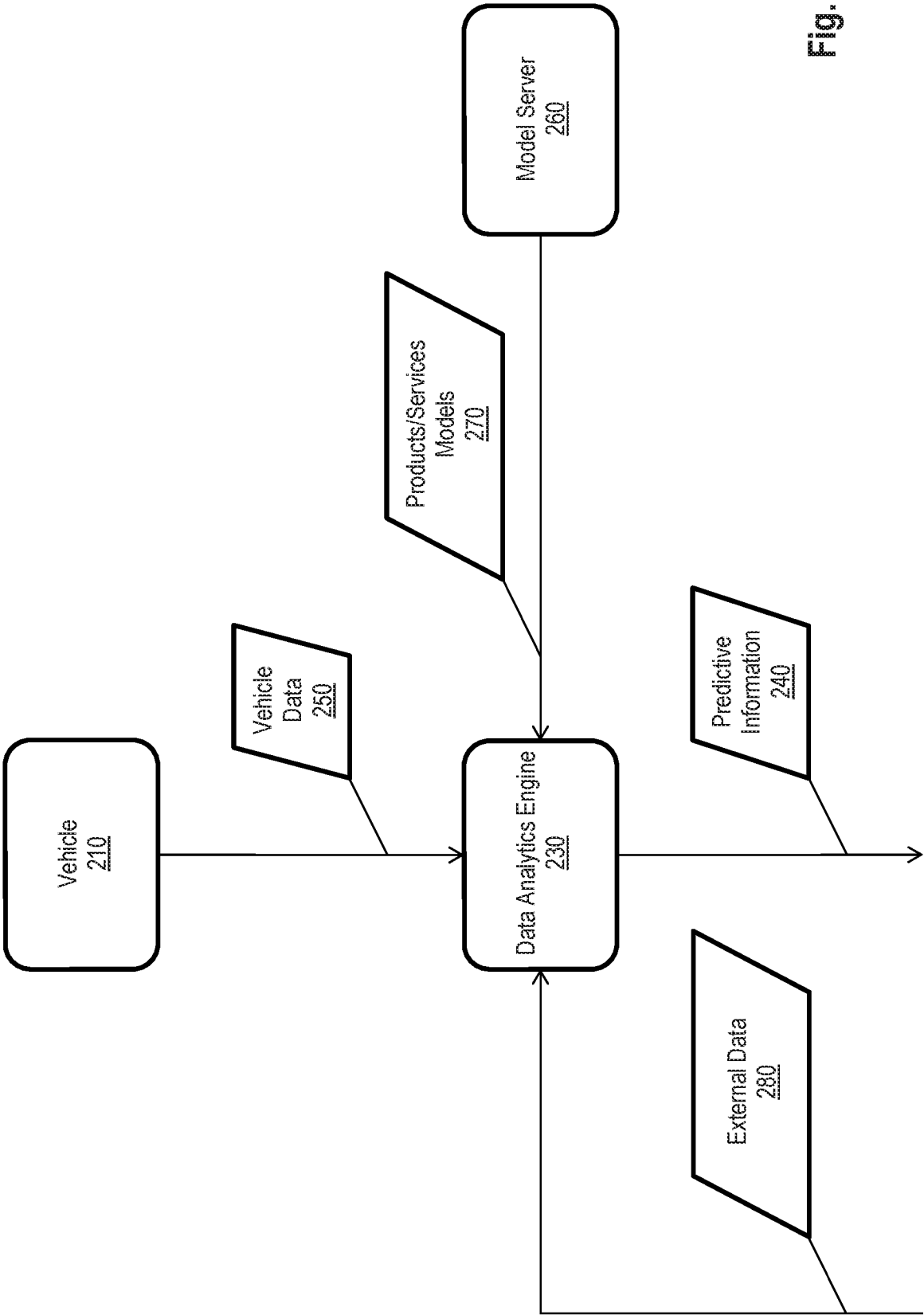


Fig. 2

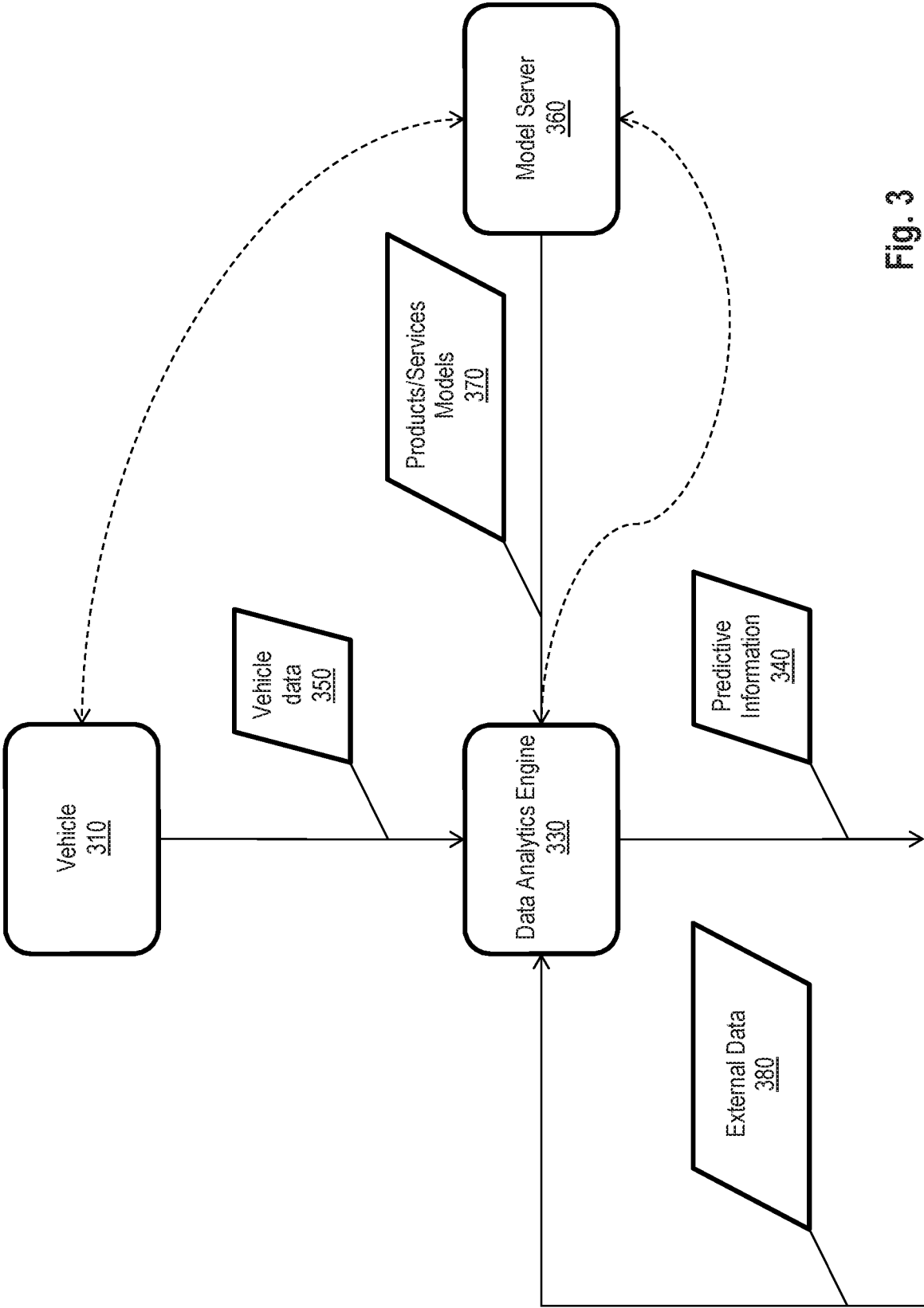
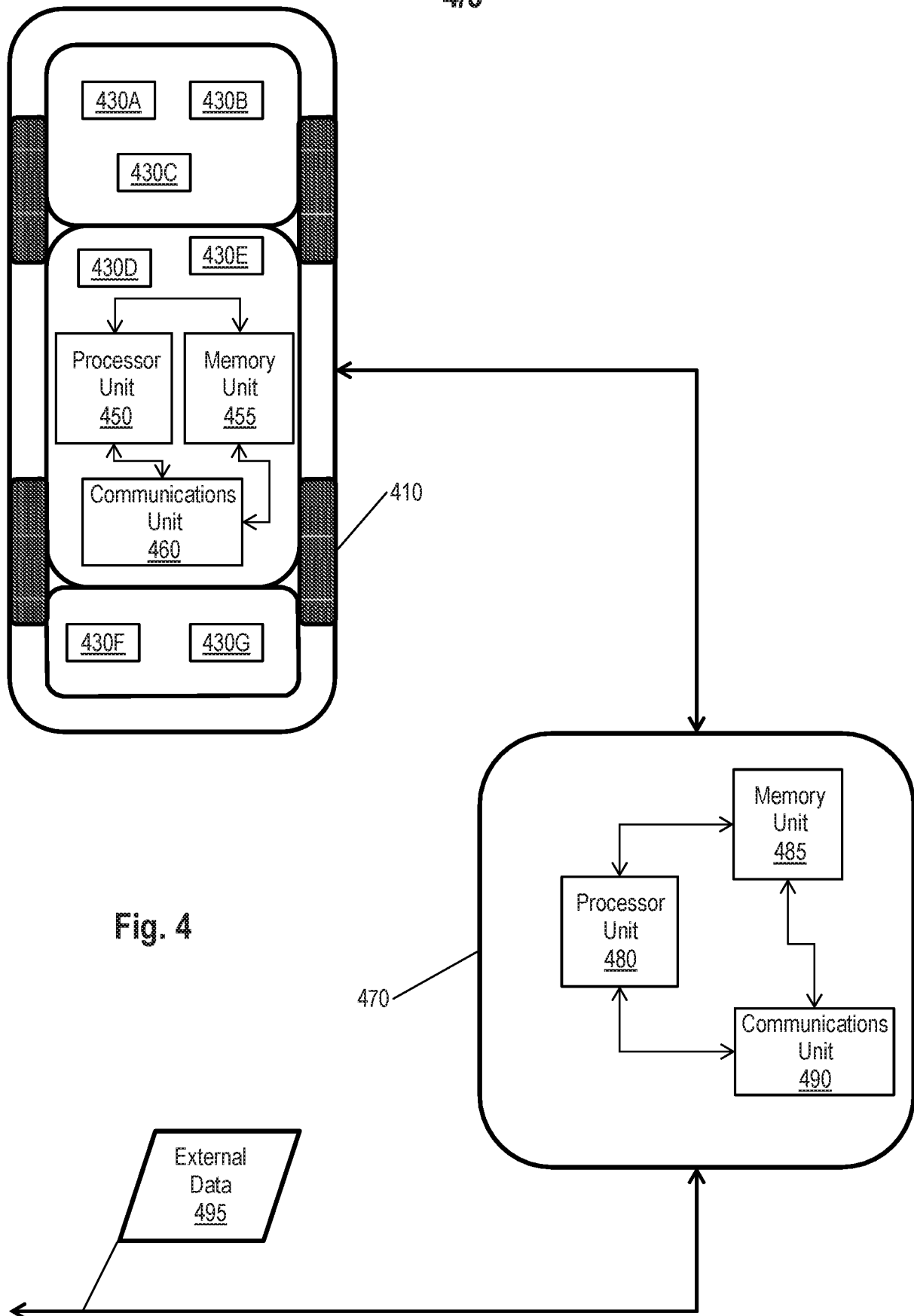


Fig. 3

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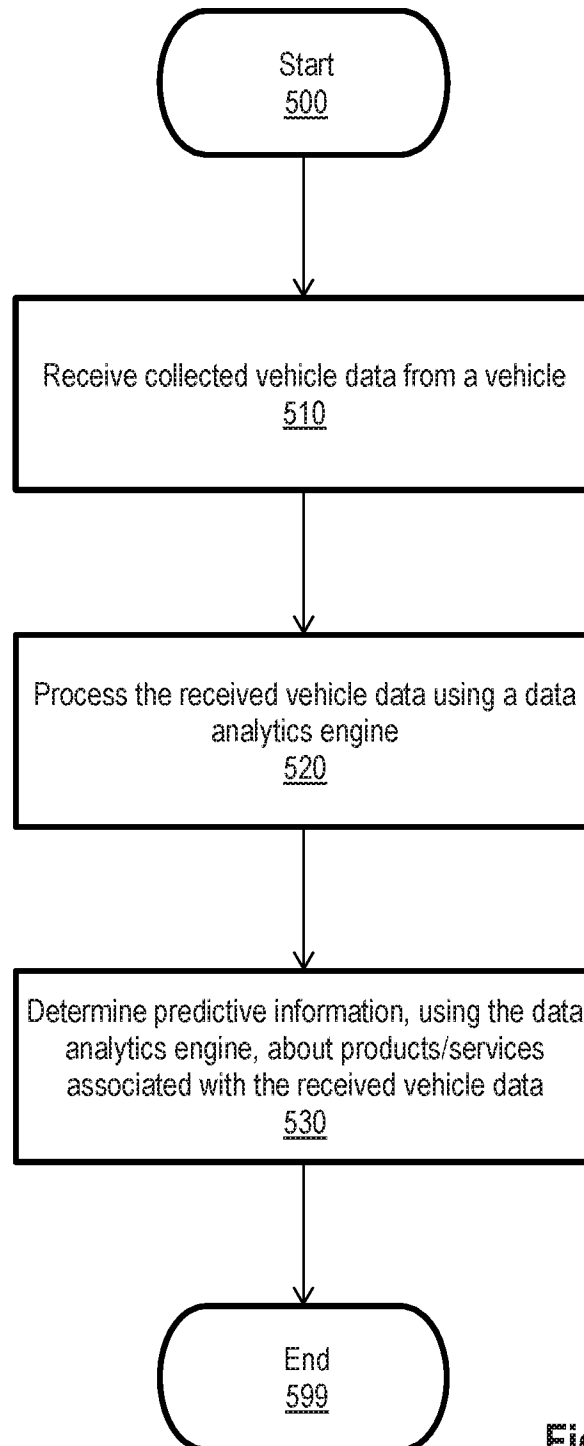


Fig. 5

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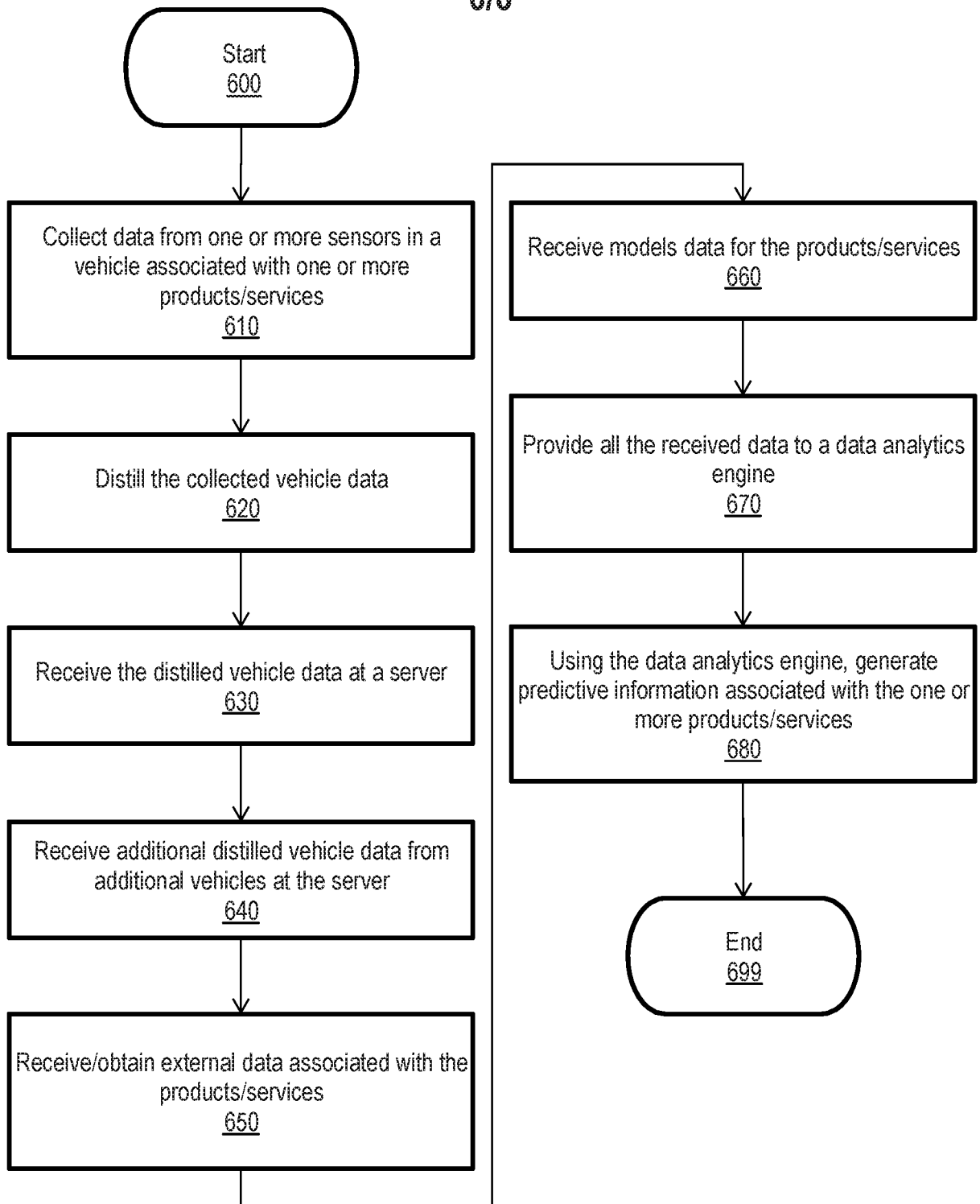


Fig. 6

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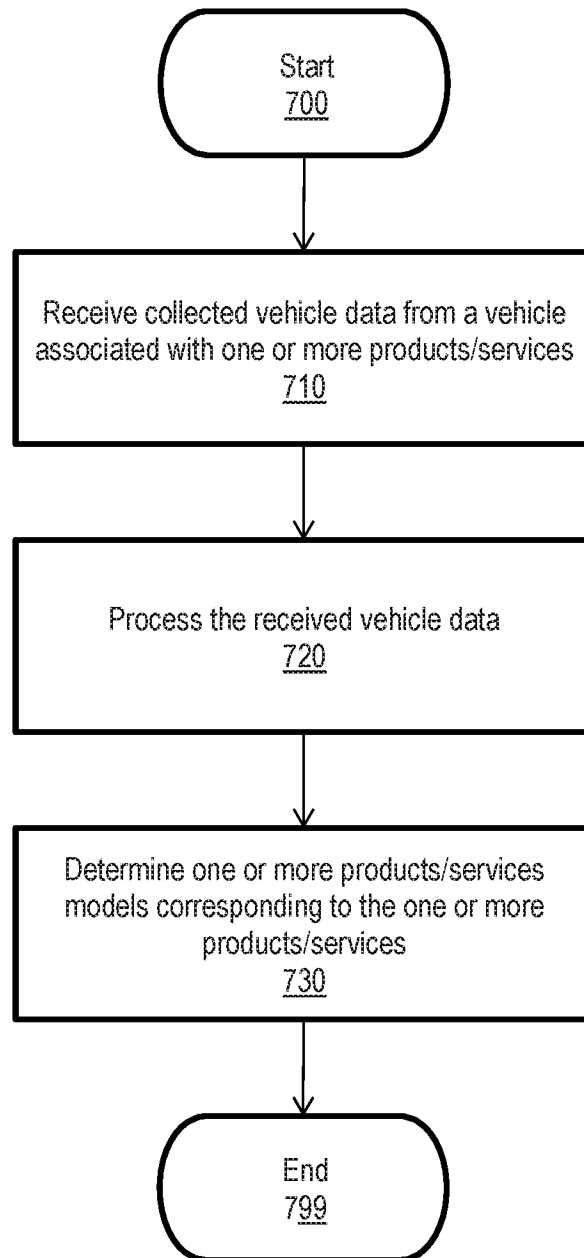


Fig. 7

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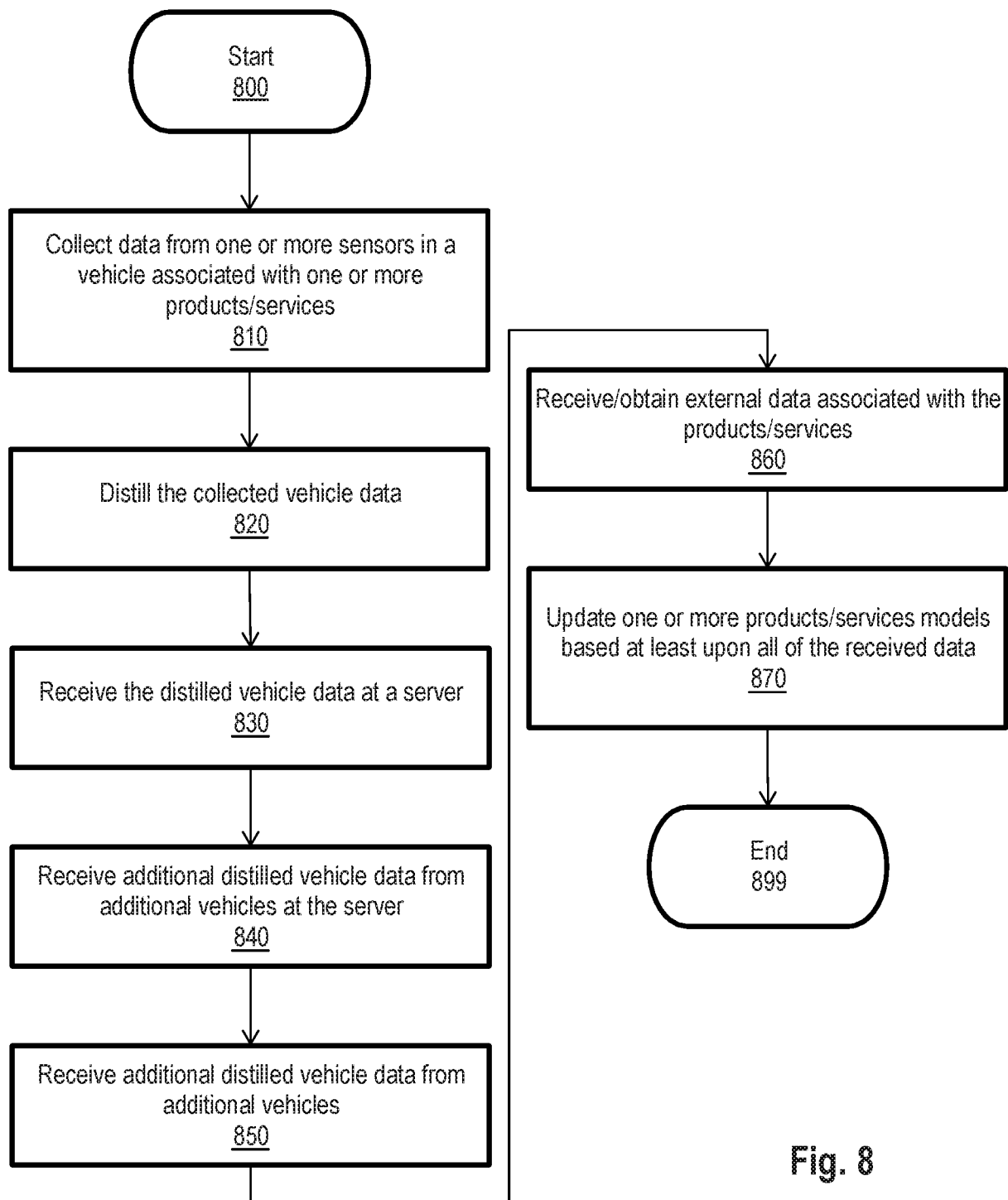


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2016/032725

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06Q10/04

ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06Q

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/142948 A1 (RATHI SOMYA [US] ET AL) 22 May 2014 (2014-05-22) the whole document -----	1-15
X	US 2015/039363 A1 (CALABRESE FRANCESCO [IE] ET AL) 5 February 2015 (2015-02-05) the whole document -----	1-15
X	US 2014/279707 A1 (JOSHUA ROBIN [CA] ET AL) 18 September 2014 (2014-09-18) the whole document -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

15 July 2016

Date of mailing of the international search report

22/07/2016

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Sigolo, Alessandro

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2016/032725

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2014142948 A1	22-05-2014	US 2014142948 A1 WO 2014081475 A1	22-05-2014 30-05-2014
US 2015039363 A1	05-02-2015	US 2015039363 A1 US 2015039372 A1	05-02-2015 05-02-2015
US 2014279707 A1	18-09-2014	NONE	