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(54) **SYSTEM AND METHOD FOR USE OF CARBON EMISSIONS IN CHARACTERIZING DRIVER PERFORMANCE**

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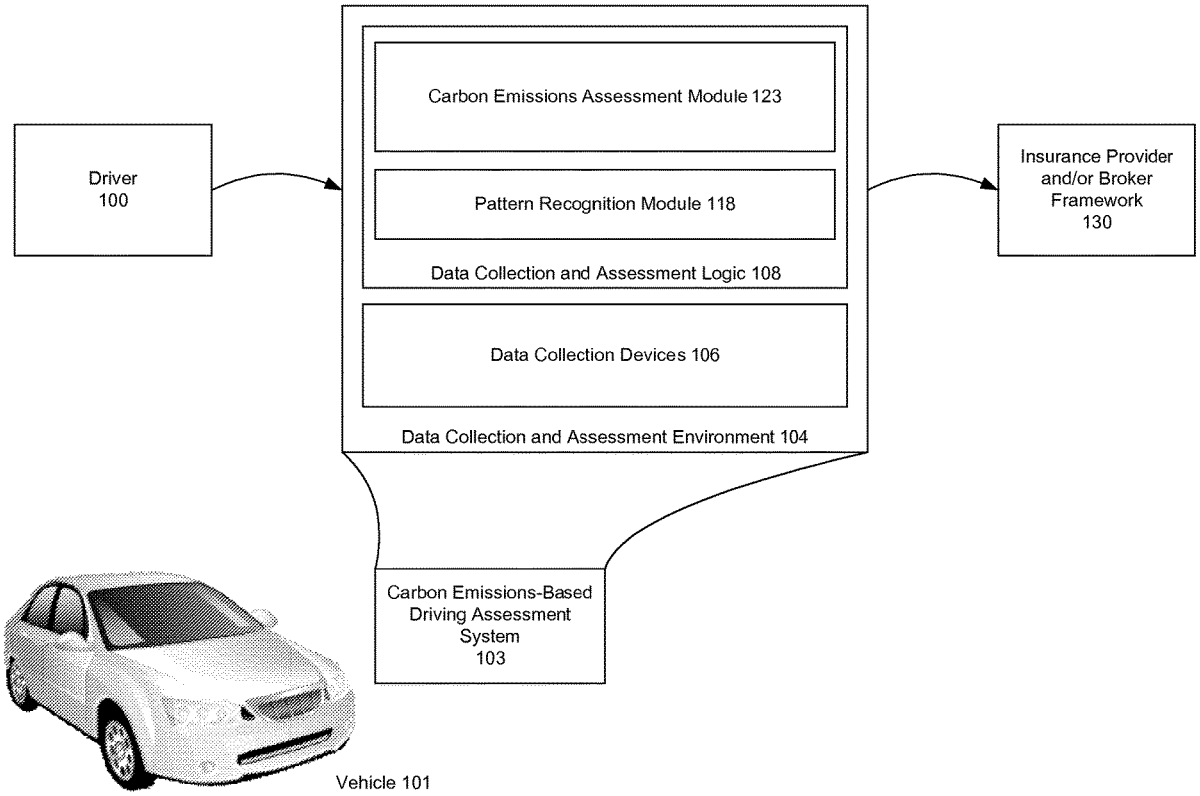
(57) **ABSTRACT**

A system and method for use of carbon emissions in characterizing driver performance and using such characterization to determine a profile/score associated with a particular insured. The profile/score can then be used to determine an insurance premium for the insured. In accordance with an embodiment, a driver can use a portable device equipped with a data collection and assessment environment, including one or more data collection devices that can be used to capture data and information or otherwise measure the carbon emissions associated with a vehicle. A framework (system) can receive information about the driver's driving profile, and use this information either to determine an insurance quote, or act as a broker/aggregator in inviting other insurance providers to offer an insurance quote, or usage based insurance quote (UBI).



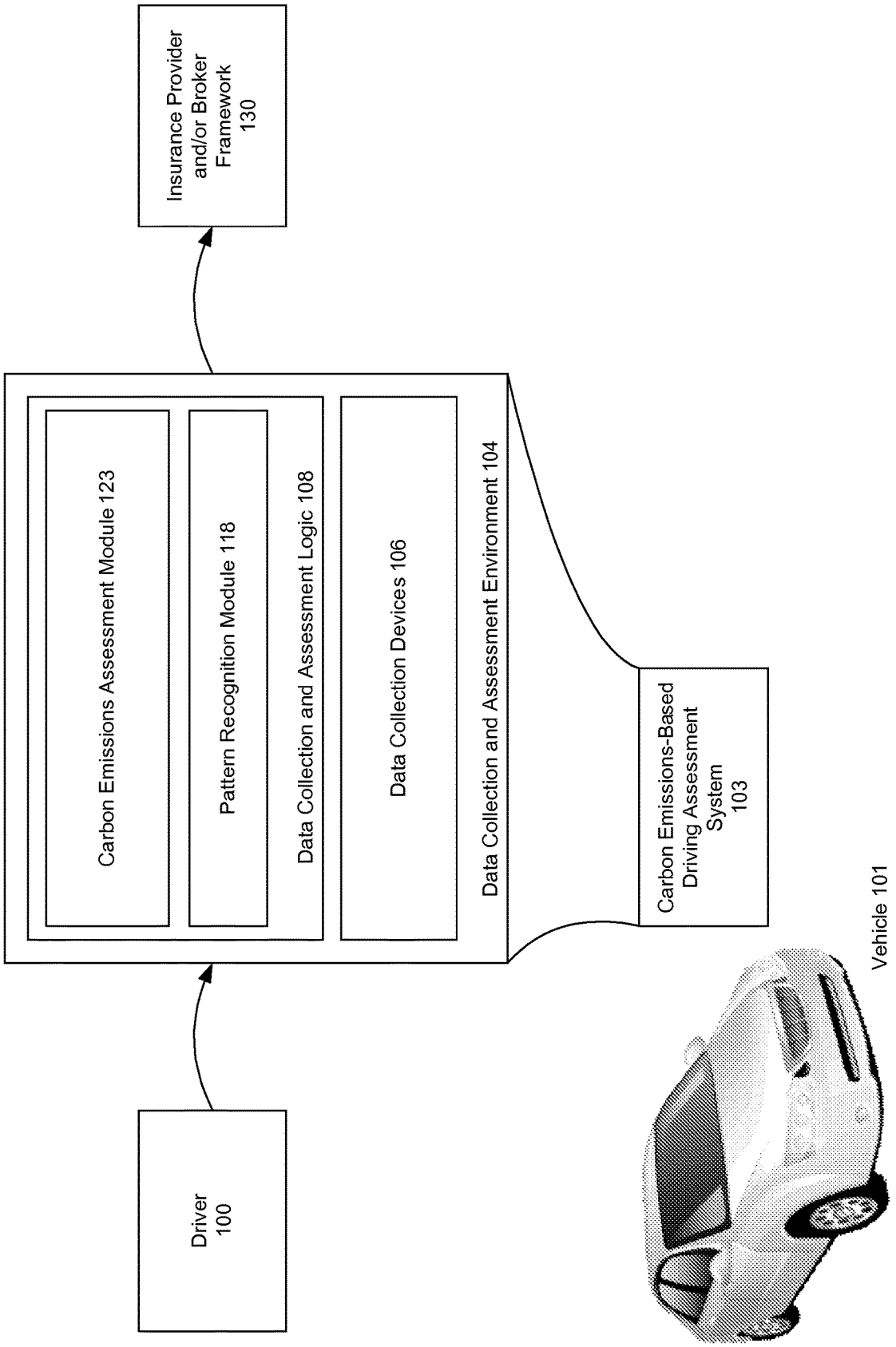

Insurance Provider and/or Broker Framework 130
Carbon Emissions Assessment Module 123
Pattern Recognition Module 118
Data Collection and Assessment Logic 108
Data Collection Devices 106
Data Collection and Assessment Environment 104
Carbon Emissions-Based Driving Assessment System 103
Vehicle 101
Driver 100

FIGURE 1

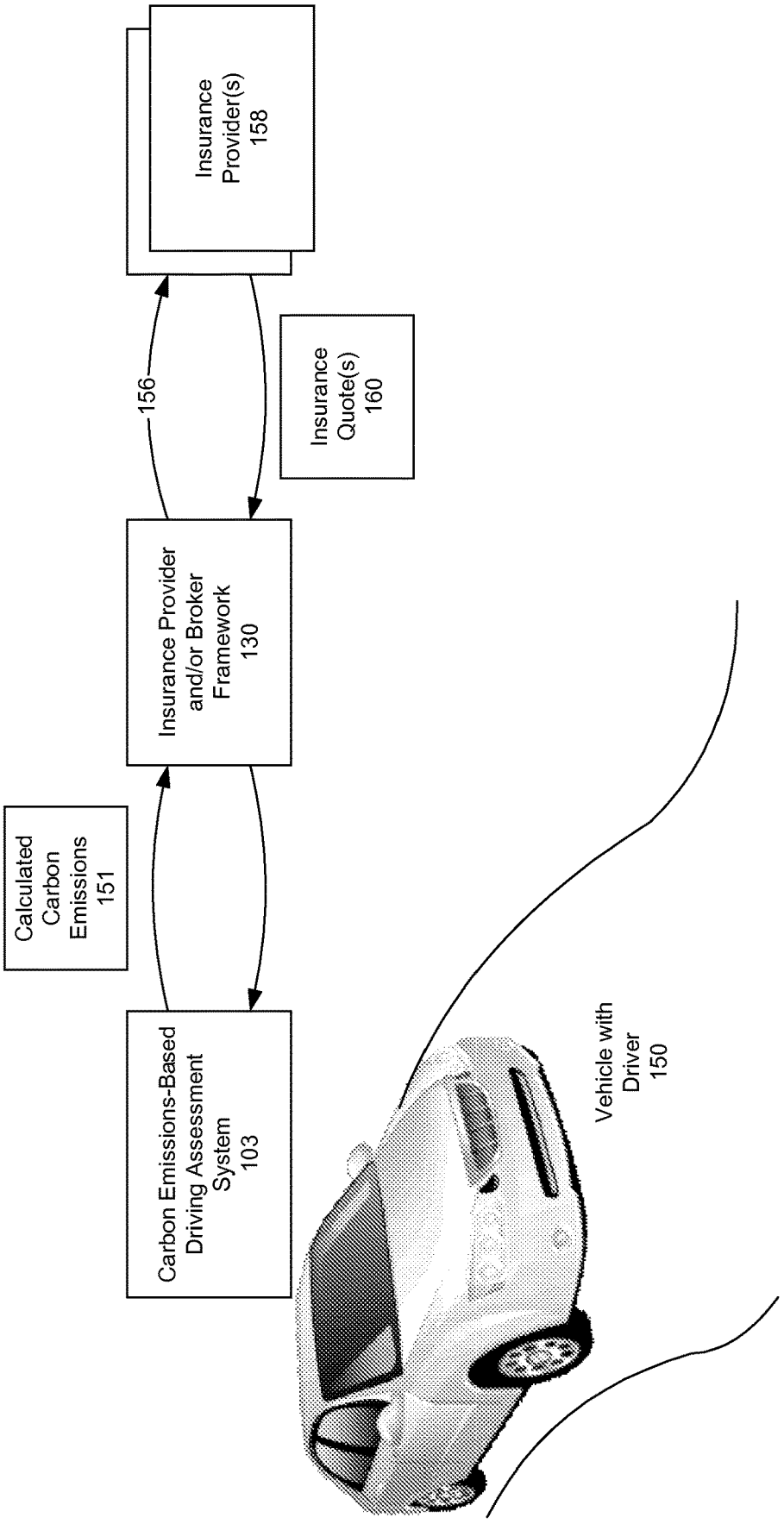

Insurance Provider(s) 158
156
Insurance Quote(s) 160
Insurance Provider and/or Broker Framework 130
Calculated Carbon Emissions 151
Carbon Emissions-Based Driving Assessment System 103
Vehicle with Driver 150

FIGURE 2

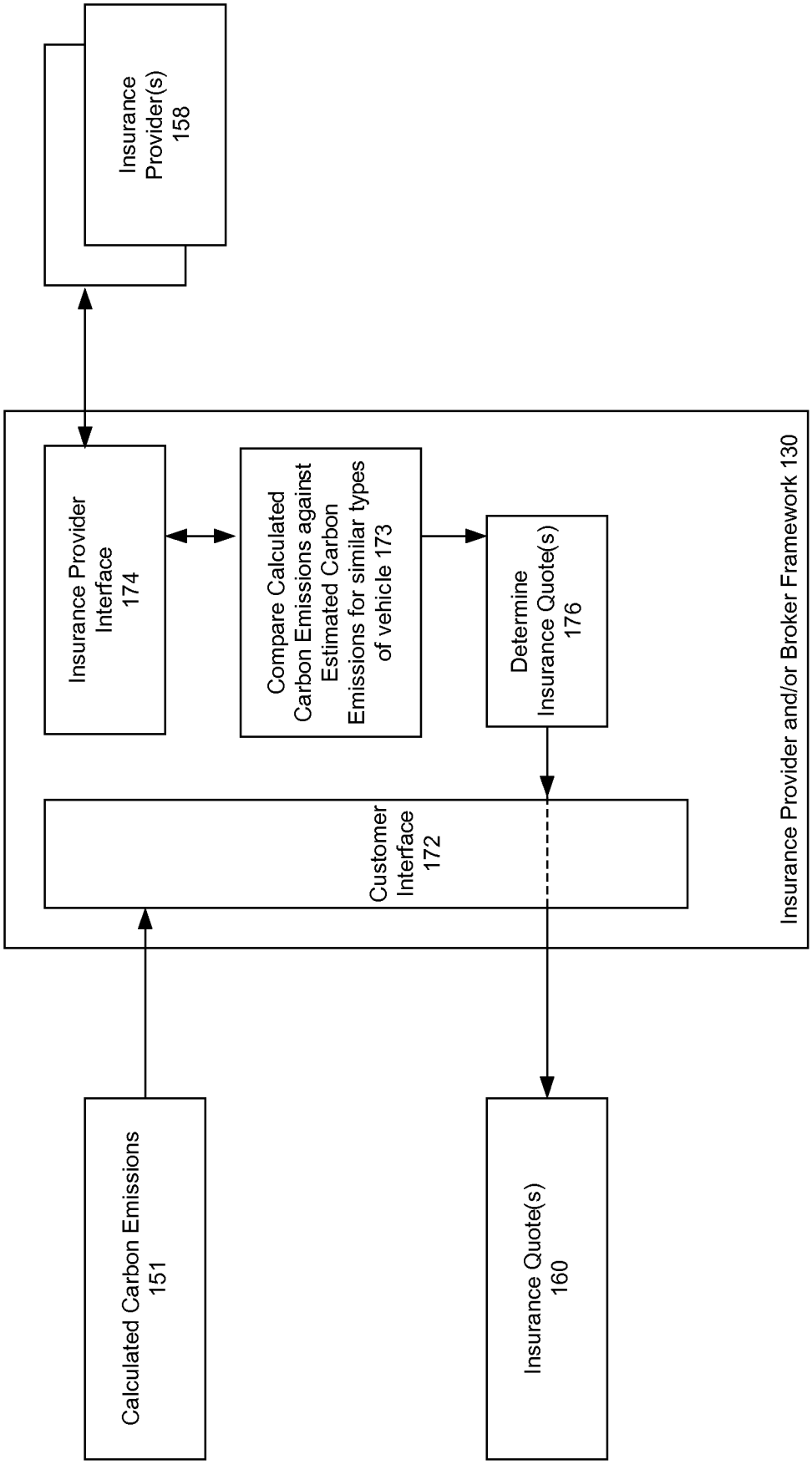

Insurance Provider(s) 158
Insurance Provider and/or Broker Framework 130
Insurance Provider Interface 174
Compare Calculated Carbon Emissions against Estimated Carbon Emissions for similar types of vehicle 173
Determine Insurance Quote(s) 176
Customer Interface 172
Calculated Carbon Emissions 151
Insurance Quote(s) 160

FIGURE 3

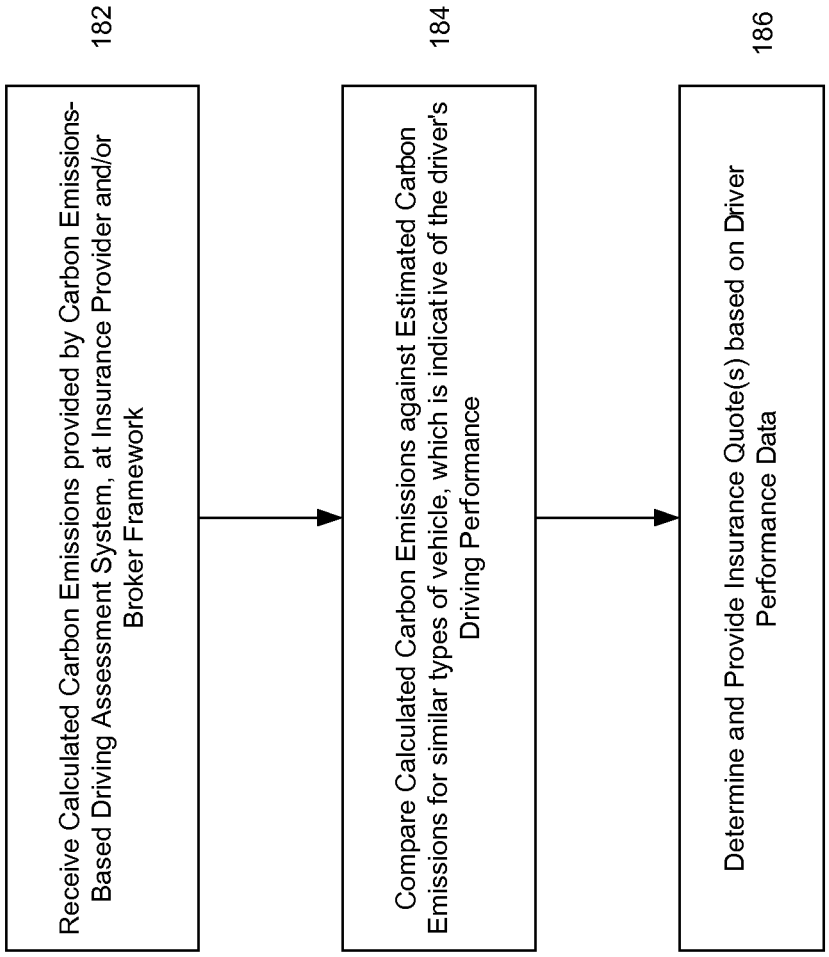

182
Receive Calculated Carbon Emissions provided by Carbon Emissions-Based Driving Assessment System, at Insurance Provider and/or Broker Framework
184
Compare Calculated Carbon Emissions against Estimated Carbon Emissions for similar types of vehicle, which is indicative of the driver's Driving Performance
186
Determine and Provide Insurance Quote(s) based on Driver Performance Data

FIGURE 4

SYSTEM AND METHOD FOR USE OF CARBON EMISSIONS IN CHARACTERIZING DRIVER PERFORMANCE

CLAIM OF PRIORITY

[0001] This application claims the benefit of priority to U.S. Provisional Patent Application No. 61/740,290, filed Dec. 20, 2012; and is related to U.S. patent application titled "SYSTEM AND METHOD FOR USE OF PATTERN RECOGNITION IN ASSESSING OR MONITORING VEHICLE STATUS OR OPERATOR DRIVING BEHAVIOR"; application Ser. No. 13/679,722, filed Nov. 16, 2012, which claims the benefit of priority to U.S. Provisional Patent Application No. 61/578,511, filed Dec. 21, 2011; U.S. patent application titled "SYSTEM AND METHOD FOR USE WITH AN ACCELEROMETER TO DETERMINE A FRAME OF REFERENCE"; application Ser. No. 13/679,749, filed Nov. 16, 2012, which claims the benefit of priority to U.S. Provisional Patent Application No. 61/616,722, filed Mar. 28, 2012; and U.S. patent application titled "SYSTEM AND METHOD FOR CHARACTERIZING DRIVER PERFORMANCE AND USE IN DETERMINING INSURANCE COVERAGE"; application Ser. No. 13/679,771, filed Nov. 16, 2012, which claims the benefit of priority to U.S. Provisional Patent Application No. 61/652,017, filed May 25, 2012; each of which above applications are herein incorporated by reference.

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FIELD OF INVENTION

[0003] Embodiments of the invention are generally related to telematics and related technologies, and are particularly related to a system and method for use of carbon emissions in characterizing driver performance and its use in determining insurance coverage.

BACKGROUND

[0004] Every time a fossil fuel such as gasoline, coal or oil, is burned, combustion gases including carbon monoxide and carbon dioxide are released into the atmosphere as carbon emissions. A common source of carbon emissions, particularly in urban areas, are automobiles and other vehicles. The amount of carbon emissions a particular vehicle generates is dependent on a variety of factors, such as the type of vehicle and its overall condition, environmental conditions, and the manner in which the vehicle is operated. For example, a vehicle driven at high speeds may generate more emissions than a vehicle driven at moderate speeds.

[0005] Information about a vehicle, together with its driver, also has a bearing on factors such as liability insurance. For example, heavily-used vehicles are on the road more often, which means they potentially have more exposure to accidents. Additionally, certain drivers may have driving habits that are considered less safe than others. Information about these and other factors is useful when formulating insurance quotes for a particular vehicle or driver.

SUMMARY

[0006] Described herein is a system and method for use of carbon emissions in characterizing driver performance and using such characterization to determine a profile associated with a particular insured. The profile can then be used to determine an insurance premium for the insured. In accordance with an embodiment, a driver can use a portable device equipped with a data collection and assessment environment, including one or more data collection devices that can be used to capture data and information or otherwise measure the carbon emissions associated with a vehicle. A framework (system) can receive information about the driver's driving profile, and use this information either to determine an insurance quote, or act as a broker/aggregator in inviting other insurance providers to offer an insurance quote, or usage based insurance quote (UBI).

BRIEF DESCRIPTION OF THE FIGURES

[0007] FIG. **1** illustrates a system for use of carbon emissions in characterizing driver performance and use in determining insurance coverage, in accordance with an embodiment.

[0008] FIG. **2** illustrates use of a system for use of carbon emissions in characterizing driver performance, in accordance with an embodiment.

[0009] FIG. **3** illustrates use of an insurance provider and/or broker framework, in accordance with an embodiment.

[0010] FIG. **4** is a flowchart of a method for use of carbon emissions in characterizing driver performance and use in determining insurance coverage, in accordance with an embodiment.

DETAILED DESCRIPTION

[0011] As described above, in the insurance industry, information about such factors as whether a driver of a vehicle observes safe driving habits is useful when formulating insurance quotes for a particular vehicle or driver.

[0012] To address this, described herein is a system and method for use of carbon emissions in characterizing driver performance and using such characterization to determine a profile associated with a particular insured. The profile can then be used to determine an insurance premium for the insured. In accordance with an embodiment, a driver can use a portable device equipped with a data collection and assessment environment, including one or more data collection devices that can be used to capture data and information or otherwise measure the carbon emissions associated with a vehicle. A framework (system) can use this information either to determine an insurance quote, or act as a broker/aggregator in inviting other insurance providers to offer an insurance quote, or usage based insurance quote (UBI).

[0013] FIG. **1** illustrates a system for use of carbon emissions in characterizing vehicle driver performance and use in determining insurance coverage, in accordance with an embodiment.

[0014] As described above, the amount of carbon emissions a particular vehicle generates is dependent on a variety of factors, such as the type of vehicle and its overall condition, environmental conditions, and the manner in which the vehicle is operated. For example, a vehicle driven at high speeds may generate more emissions than a vehicle driven at moderate speeds.

[0015] As shown in FIG. **1**, in accordance with an embodiment, a driver **100** of a vehicle **101** can use a carbon emissions-based driving assessment system **103**, which can be provided as a portable device (e.g., a smartphone, PDA, computer, or other portable device), and which is equipped with a data collection and assessment environment **104**.

[0016] In accordance with an embodiment, the assessment system can itself include one or more data collection devices **106** (e.g., accelerometers, GPS, or other measurement devices) that can be used to capture data and information or otherwise measure vehicle actions, together with a data collection and assessment logic **108**. A pattern recognition module **118** is configured with one or more defined operating patterns, each of which operating patterns reflects either a known change in vehicle status, or a known vehicle operating or driving behavior. For example, a vehicle responds in a physically-measurable manner to driver-based driving actions, e.g., by the driver turning the vehicle sharply at a corner. This enables the system to associate patterns with certain driving behaviors.

[0017] In accordance with an embodiment, a carbon emissions assessment module **123** includes information about typical carbon emissions, and can compare current patterns of driving with known patterns to calculate carbon emissions for a current driver/vehicle.

[0018] The resultant information can be remotely communicated to an external insurance provider and/or broker framework (system) **130**, which uses the received information in comparing the calculated carbon emissions against estimated carbon emissions for similar types of vehicle, which is indicative of the driver's driving profile, and using the results in determining insurance quotes for the current vehicle/driver, or inviting other insurance providers to offer an insurance quote, or a usage based insurance quote (UBI).

[0019] In accordance with an embodiment, results from the carbon emissions assessment module can be compared with physical emission measurements in order to determine a precision built-in error. This enables certainty levels to be attached to the calculated emissions, which allow a plus/minus range and a statistical treatment of the difference between calculated emissions and manufacturer expected emissions. In turn, this can be used to associate confidence intervals with driver quality prediction scores.

[0020] In accordance with an embodiment, the system can incorporate or utilize additional functionality as further described in U.S. patent application titled "SYSTEM AND METHOD FOR USE OF PATTERN RECOGNITION IN ASSESSING OR MONITORING VEHICLE STATUS OR OPERATOR DRIVING BEHAVIOR"; application Ser. No. 13/679,722, filed Nov. 16, 2012, which claims the benefit of priority to U.S. Provisional Patent Application No. 61/578,511, filed Dec. 21, 2011, herein incorporated by reference.

[0021] FIG. **2** illustrates use of a system for characterizing driver performance, in accordance with an embodiment. As shown in FIG. **2**, during use, a driver of a vehicle **150** can use the carbon emissions-based driving assessment system to calculate carbon emissions for the current driver/vehicle, and to communicate **151** the information to an insurance provider and/or broker framework for use in determining an insurance quote, or act as a broker/aggregator in inviting **156** other insurance providers **158** to offer an insurance quote **160**.

[0022] FIG. **3** illustrates use of an insurance provider and/or broker framework, in accordance with an embodiment. As shown in FIG. **3**, an insurance provider and/or broker framework includes a customer interface **172** that allows a driver to communicate their calculated carbon emissions, and an insurance provider interface **174** that enables the insurance provider and/or broker to invite other insurance providers to offer **176** an insurance quote personalized to the driver, based on a comparison **173** of the calculated carbon emissions against estimated carbon emissions for similar types of vehicle. The information received from the carbon emissions-based driving assessment system can be secured and/or anonymized prior to determining the driver's insurance quote, or inviting other insurance providers to offer an insurance quote.

[0023] FIG. **4** is a flowchart of a method for use of carbon emissions in characterizing driver performance and use in determining insurance coverage, in accordance with an embodiment. As shown in FIG. **4**, at step **182**, the system receives calculated carbon emissions provided by the carbon emissions-based driving assessment system, at the insurance provider and/or broker framework. At step **184**, the system compares calculated carbon emissions against estimated carbon emissions for similar types of vehicle, which is indicative of the driver's driving profile. At step **186**, the system determines and provides insurance quote(s) based on the calculated carbon emissions for the driver/vehicle.

[0024] The present invention may be conveniently implemented using one or more conventional general purpose or specialized digital computers or microprocessors programmed according to the teachings of the present disclosure, or a portable device (e.g., a smartphone, PDA, computer or other device), equipped with a data collection and assessment environment, including one or more data collection devices (e.g., accelerometers, GPS). Appropriate software coding can readily be prepared by skilled programmers based on the teachings of the present disclosure, as will be apparent to those skilled in the software art.

[0025] In some embodiments, the present invention includes a computer program product which is a non-transitory storage medium (media) having instructions stored thereon/in which can be used to program a computer to perform any of the processes of the present invention. The storage medium can include, but is not limited to, any type of disk including floppy disks, optical discs, DVD, CD-ROMs, microdrive, and magneto-optical disks, ROMs, RAMs, EPROMs, EEPROMs, DRAMs, VRAMs, flash memory devices, magnetic or optical cards, nanosystems (including molecular memory ICs), or any type of media or device suitable for storing instructions and/or data.

[0026] The foregoing description of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. The embodiments were chosen and described in order to best explain the principles of the invention and its practical application, thereby enabling others skilled in the art to understand the invention for various embodiments and with various modifications that are suited to the particular use contemplated.

For example, although the illustrations provided herein primarily describe embodiments using vehicles, it will be evident that the techniques described herein can be similarly used with, e.g., trains, ships, airplanes, containers, or other moving equipment, and with other types of data collection devices. It is intended that the scope of the invention be defined by the following claims and their equivalence.

What is claimed is:

1. A system for use of carbon emissions in characterizing vehicle driver performance and use in determining insurance coverage comprising:

a data collection and assessment environment, including

one or more data collection devices that can be used to capture data and information or otherwise measure vehicle actions,

a data collection and assessment logic, and

a carbon emissions assessment module which includes information about typical carbon emissions, and can compare current patterns of driving with known patterns to calculate carbon emissions for a current driver/vehicle; and

wherein the data collection and assessment environment is configured to one or both

compare current patterns of driving with known patterns to calculate carbon emissions for a current driver/vehicle, and

provide the information to an external insurance provider or broker framework to calculate a driver profile, for use in obtaining a usage based insurance quote (UBI) for the driver.

2. The system of claim **1**, wherein results from the carbon emissions assessment module are compared with physical emission measurements in order to determine a precision built-in error, which enables certainty levels to be attached to the calculated emissions, and which can be used to associate confidence intervals with driver quality prediction scores.

3. A method for use of carbon emissions in characterizing vehicle driver performance and use in determining insurance coverage comprising:

providing a data collection and assessment environment, including

one or more data collection devices that can be used to capture data and information or otherwise measure vehicle actions,

a data collection and assessment logic, and

a carbon emissions assessment module which includes information about typical carbon emissions, and can compare current patterns of driving with known patterns to calculate carbon emissions for a current driver/vehicle; and

wherein the data collection and assessment environment is configured to one or both

compare current patterns of driving with known patterns to calculate carbon emissions for a current driver/vehicle, and

provide the information to an external insurance provider or broker framework to calculate a driver profile, for use in obtaining a usage based insurance quote (UBI) for the driver.

4. The method of claim **3**, wherein results from the carbon emissions assessment module are compared with physical emission measurements in order to determine a precision built-in error, which enables certainty levels to be attached to the calculated emissions, and which can be used to associate confidence intervals with driver quality prediction scores.

5. A non-transitory computer readable medium, including instructions stored thereon which when read and executed by one or more computers cause the one or more computers to perform the steps comprising:

providing a data collection and assessment environment, including

one or more data collection devices that can be used to capture data and information or otherwise measure vehicle actions,

a data collection and assessment logic, and

a carbon emissions assessment module which includes information about typical carbon emissions, and can compare current patterns of driving with known patterns to calculate carbon emissions for a current driver/vehicle; and

wherein the data collection and assessment environment is configured to one or both

compare current patterns of driving with known patterns to calculate carbon emissions for a current driver/vehicle, and

provide the information to an external insurance provider or broker framework to calculate a driver profile, for use in obtaining a usage based insurance quote (UBI) for the driver.

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