



(51) International Patent Classification:

G06F 17/30 (2006.01) G08G 1/01 (2006.01)
G06Q 10/00 (2012.01) G01C 22/00 (2006.01)

(21) International Application Number:

PCT/IB2017/057545

(22) International Filing Date:

30 November 2017 (30.11.2017)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/553,925 04 September 2017 (04.09.2017) US

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

(54) Title: SYSTEM AND METHOD FOR MONITORING VEHICLE HISTORY

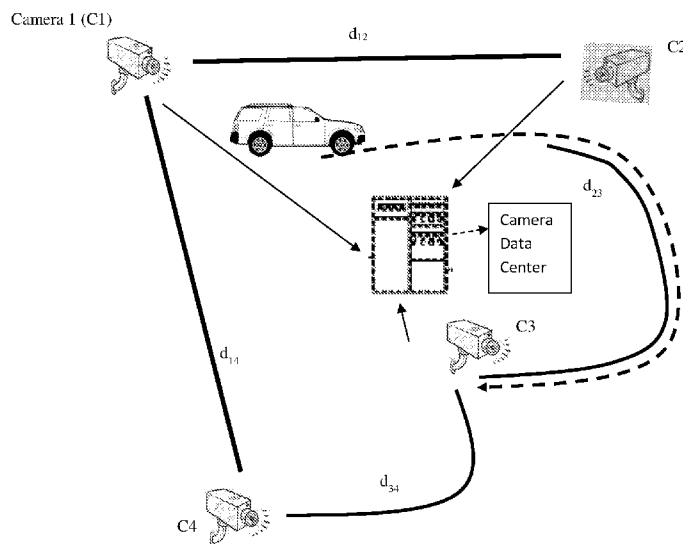


Fig. 1b

(57) Abstract: A system and method is presented to estimate the distance traveled by a vehicle through calculating the distance between LPR cameras which detect the vehicle. The information obtained by this method, can then be sent to a data base to be included in the vehicle's history which are obtained from different centers (such as smog/inspection centers, Police Dept., car dealers, Auto-Service/Maintenance center, insurance agencies, etc.) These information can then be provided to interested persons who are willing to have vehicle's history such as potential customers, Police Dept, other authorities, etc.



Declarations under Rule 4.17:

- *as to the identity of the inventor (Rule 4.17(i))*
- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

- *with international search report (Art. 21(3))*

1. Title of the invention

System and method for monitoring vehicle history

2. Technical field of invention

The present invention relates to electronic systems for estimating the distance traveled by a vehicle, also systems for monitoring and accessing the status and records of vehicles using electronic equipment, telecommunication devices and data centers.

3. Background:

In car sales, car quality is always one of the concerns of buyers, which naturally finds a strong dependence on its history. In most countries, the buyer usually asks for a mechanic to check the vehicle for quality assurance. But even in such cases, many possible car flaws may be hidden from the buyer's point of view. Hence, it would be very useful to have a reference point that would help the buyer when he bought a car and show him a car's history. On the other hand, another problem with car buyers is to ensure the correct mileage of the car. This amount can be tampered with in different ways and keep the vehicle's health out of the eyes of the buyer. Here's an invention that buyers can use to learn about vehicle history and consider all aspects of their purchases when deciding what to do. Also, by this method, buyers can, if they so desire, have a minimum estimate of the actual number of car's odometer and be more confident to buy a car. In previous patents, most of the systems used for similar purposes were based on the use of RFID technology. Thus, the car's history is stored in an electronic chip (RFID) and the chip connects to a part of the car and then uses an RFID Reader to read the contents of the electronic chip. The location of the RFID chip can also be, depending on its use, embedded as hidden or perceptible on the car. In the patent number US 2014/0213176 A1, which introduces an active system, a transmitter is mounted on a vehicle that sends a VIN number or another car ID, while receivers that can be in a closed or open environment, upon receipt of this information, can obtain other information such as the location of a car, payment status of parking fees, etc. The owner of the car will also, in case of forgetting the car park location or car stolen, be informed of the location of his vehicle, using the information received by the receiver. In patent number US006121880A, various vehicle information, including toll payments, insurance, technical inspection approvals, etc , is stored on an RFID chip and affixed to the windshield. Then, an RFID reader, which can

30 be installed on payment stations, for example, automatically reads this information and informs
of their status. In the patent number US 8,754,751 B1, which is very similar to patent
US006121880A, the vehicle information is stored on an RFID chip. This information can then be
transmitted by a wireless transmitter to police car that a similar system mounted on it and then
the system on the police car then checks their accuracy and credibility by getting this information
35 and checking them with information contained in the police database. Also, in some patents,
methods have been proposed to measure the distance traveled by a vehicle, which is mainly
based on client-based methods that requires the installation of an additional piece on vehicle. In
these methods, attempts have been made to find a way to reduce the odometer error during rain
and slippage of the road, which can cause an error in the number of readings on odometer. In
40 these types of patents, however, a method is not proposed for the buyer to indicate the correct
(approximate) number of odometer. In some patents such as patent number 5025401, a system is
proposed for calculating the distance traveled by a vehicle, by installation of several sensors on
the vehicle, including the speed sensor, vehicle acceleration sensor, and other electronic circuits
to calculate the vehicle's steering wheel slip that happens during rain and slipping the steering
45 wheel; this provides a more accurate way to calculate odometer numbers. In patent No.
US8655544B2 a system and method has been suggested by which, using a mobile system such
as a mobile phone that is located outside of the vehicle and located at a distance, and equipped
with a GPS-based system, and some other electronic circuits located on the vehicle, some
information about the car is sent to the mobile phone (or mobile system) and from there is sent to
50 a central database and the distance traveled by the car is measured.

In the previous patents, which are generally included in the Client Based Systems due to the use
of equipment and systems that are mounted on a car, they have a major problems like high cost
and being disabled by the client. Also, the use of manpower by authorities or professionals
increases the cost of using such methods. The invention presented here, does not have any of
55 these disadvantages and uses the existing infrastructure to solve the problem. It is necessary to
explain that the meaning of the "car" here is a variety of motor vehicles, including motorcycles,
light and heavy vehicles.

4. Summary of the Invention

60 As a way of obtaining an estimate of the distance traveled by the vehicle, it is suggested that an estimated distance traveled by the vehicle be obtained using LPR (License Plate Recognition) cameras installed on the road and public passageways. For this purpose, each time the car is viewed by one or more of these cameras, then using the location information of these cameras, the time the vehicle was viewed by these cameras, and the distances of these cameras from each other, it is possible to estimate the distance. After obtaining this approximate number of distances, this number is added to the database to information about the distance traveled by the vehicle, and thus the distance traveled by the vehicle over a period of time (e.g., a one-day, one-month, One year, etc.) can be obtained. To calculate the distance traveled by the car using cameras, it should be noted that calculating this value when traveling on intercity routes is much easier than when a car travels in urban areas. Therefore, it is best (or if desired) that we use a separate formula for cameras that are installed on roads outside the city than cameras that are installed inside the city. Different methods of calculating distances with this system are described below. This information (for the distance traveled by the car, can then be included in the vehicle history (gathered from different centers), to be shown to the potential customer or authorities.

5. Brief Description of Drawings:

Figure 1a shows a simple system visualization in the form of a block diagram.

Figure 1b shows how a diagram of how cameras which detect the car passing are connected to a data center

Figure 1c shows a simple system block diagram without the camera's information

Figure 1d shows how the information of smog/inspection devices are sent to the data center.

6. Detailed description

In this invention, a system and method is proposed for obtaining information about the distance traveled by the vehicle to be included in the vehicle history. It is also suggested that the

distance traveled data, along with other vehicle information, be stored in a central database. This database contains various information of the vehicle including ownership history (personal, company or rent), date of purchase and sale, the results of technical examination (especially the exhaust emission test), etc. Information on vehicle is gathered from relevant organizations and is stored in the database. People who want to buy a car can access the database by paying a subscription fee and find car information. With this service system, customers will be informed of vehicle history and will be aware of possible engine problems and other issues. This database can be used by people, dealers, car showrooms, companies and other centers. In order for such a system to be trusted, it is necessary that the data relating to the technical examination of the car, in the absence of manual intervention, be included in this database. In this way, the buyer can refer to this information before buying, and will largely know the health and history of the car. Figure 1a shows a simple system visualization in form of a block diagram. It should be noted that this form has no limiting aspect and other visualizations can be considered for the system. The explain of units shown in Figure 1a. It is stated below:

- Technical examination center: Information about vehicle technical examination, including the exhaust fumes test, will be transferred to a database (Unit 2).
- Datacenter 2: The results of the technical examination of vehicles will be transferred to this center. This database can be located at the Ministry of Interior, Municipality, the traffic police department or other relevant organizations.
- Datacenter 3: This database (usually located at the police station) can contain various types of information, such as owner / owners information and car driver / drivers, vehicle theft information, information about customs clearance (for imported vehicles), all or part of car accident data (such as time and place of accident, accident victims, accident report, etc.), vehicle purchase and sales information, and other vehicle related information, such as the chassis number, Engine number, vin number, color, license plate number and so on.
- Datacenter No. 4: where information on car accidents that insurance enter has paid for it has stored. In this way, major car accidents (if reported to the insurance company)

- 115 can be identified and can be included in the vehicle identification. Also, if you wish, information about the car insurance can also be stored.
- Datacenter No. 5: where Vehicle information provided by the vehicle manufacturer is stored. This information can include, for example, the vin number of the vehicle, chassis number, year of production, model, color, engine type, and all other vehicle
120 related information. Also, if the parts are exchanged through the agents of the company, the relevant information (such as replaced parts, dates, new parts, etc.) can be stored in this database.
 - Server and database (No. 7): In this unit, the data of the cameras that detect the vehicle's traffic are recorded and processed to calculate the approximate distance
125 traveled by the vehicle.
 - Access System (No. 1): This access system includes servers and other equipment necessary for the exchange of information between it and other system components (such as the above mentioned databases). When the user intends to use the service, s/he will be connected to the access system via the computer or other equipment, such
130 as notebooks and smartphones, through which the service is being requested. By accessing the databases described above, the access system receives the necessary information and provides it to the user. The access system can also have a database itself that stores the information received from other databases, this way the information can first be stored in it and then they are provided to the user. In this
135 case, this database can be completely independent of other databases or be integrated with one of the previous databases (databases 2, 3 and 4) in one place.

It should be noted that the databases described above can either be merged with another, or, conversely, split into smaller or local sections and located in more than one location. Other databases can also be used to obtain information about the car and its owners, such as the
140 databases of the registry offices (where information about vehicle purchases and sales is registered), authorized dealers, authorized repair shops, etc. Therefore, some information such as car sales information can be found in database 3 or in another database or in an independent database. Note that one or more of the above mentioned databases can be merged into one

database such that their information be in one database. For example, Database 7, which stores camera information, can be combined with the police database (unit 3 in Fig. 1a) or the possible database of the access system (which the user can access to). It should also be noted that each of the above Units that are introduced as datacenter, can (in addition to a database) have a server for processing information and other equipment for sending and receiving information.

Another point is that one or more of the above-mentioned vehicle information can be ignored , or different access levels can be defined for different information that are provided based on the level of authority; for example, some confidential information can only be provided to authorities or persons such as Police. Also, for a portion of the information, higher price may be asked of the user (that is, the person who is interested in using the system's services); thus, prices can be set for different information.

Calculating distance traveled between cities

To calculate intercity distance traveled by vehicle using intercity cameras, when the car is seen on the road, according to the address of the vehicle's owner, it can be assumed that , the car has been used for a trip. In this situation, different cases can be considered to calculate the distance traveled between the cities. For example:

- It is possible that the car just travels to one city and then uses the same path to come back to its location. In this case, cameras detect the car on the going path or return path or on both directions, so the distance traveled by a car will be simply obtained by doubling the distance between the two cities, ((because later the car should return to its original location). For example, for a vehicle which its owner lives in Isfahan, if the car is registered by cameras in Tehran, the distance traveled by the car is equal to:
- Distance traveled by car = twice the distance between Isfahan – Tehran
- If the car was seen outside of the city and again it was seen in cities or the gate of other cities (or roads leading to that town) it means that the car would have choosen more than one city to travel. For example, it may have a circular track. For example, for a vehicle for which its owner lives in Isfahan, if it is seen in Tehran (or the road leading to Tehran), and then seen in Mashhad, Gorgan, Rasht, and Hamedan,

respectively, eventually the car will return to Isfahan (unless a disaster, sale, theft or other factors occurs). The vehicle's return to Isfahan is likely to be detected by cameras (if there was no error in the work of the cameras) on the way to Isfahan or in Isfahan. So, as long as the route is correctly recorded by the cameras, the distance traveled by the vehicle can be calculated with a fairly good accuracy by calculating the distances of the aforementioned cities. For the last city on the road where the car was seen (such as Hamadan in the above example), it is possible to calculate its distance from Isfahan and introduce in the calculation. Therefore, the distance traveled by the vehicle in the example above is obtained by the formula below:

Distance traveled by the vehicle = (distance between Isfahan - Tehran) + (distance between Tehran - Mashhad) + (distance between Mashhad - Gorgan) + (distance between Gorgan - Rasht) + (Distance between Gorgan - Hamadan) + (Distance between Hamadan - Isfahan)

Note that Google's service or other methods can be used to calculate intercity (and intracity) distances.

Another important point is that the method used here to calculate the intercity distance traveled by car can be used to calculate the distance traveled in the city, with the difference that instead of the owner's city address, his/her neighborhood in which s/he resides is considered, and instead of cities on the road in the previous section, the neighborhoods and the streets where the car passes are considered.

Calculating the distance traveled within the city

For intra-city cameras, the task is a bit more complicated than calculating inter-city distances. The reason for this is that in the city, to go from one point to another, in addition to the main streets, there are many side-roads that are not necessarily equipped with camera. So, a car that it's registered by a camera while going on a path, maybe returns to its original location from the other routes and its return does not be registered by any camera. Therefore, we must use either methods based only on calculating camera information to calculate the distances (definite or deterministic methods), or statistical methods (statistical and probabilistics), or a combination of

both. Therefore, there are many different methods that can be used to calculate distances. In the following, the general principles of these two methods along with some examples are explained.

Deterministic/ semi- deterministic method:

As stated, in deterministic methods, information about the cameras are used, including: the time of recording of the car by them, the location of cameras that record the vehicle's movement, and the distances between the cameras.

An example of a deterministic / semi- deterministic method is the method used to calculate the distance between cities in the previous section. As previously mentioned, this method can also be used to calculate the distance traveled in the city, with the difference that instead of the city of residence of the owner, the neighborhood of which he/she lives will be considered, and instead of the cities on the road in the previous section, the neighborhoods and the streets that the car passes through are considered. So, for example, a person living in Tehran's Shahrān neighborhood, and then seen in Vanak Square, Farmanya Square, and Imam Khomeini Square respectively, by calculating the distances of these places (such as the example described in the previous section) the distance traveled by car can be obtained, that means:

Distance traveled by the car = (Distance between Shahrān-vanak) + (Distance between Vanak-Farmaniyeh) + (Distance between Farmanieh-Imam Khomeini square) + (Distance between Imam Khomeini Square - Shahrān)

In this way, it's best to consider a specific time to calculate the car's return to its neighborhood, for example, one day (or a week, etc.). This amount of time can be used to reset calculation of the vehicle traveled distances . For example, if this amount is considered one day, then the calculations reset every day, this means that the last camera which sees the car on Saturday, is being taken into account for the final calculations of the car's distance traveled on Saturday, and there is no longer any track record (from Saturday) in intraurban mileage calculations for Sunday, and on Sunday, calculations start from scratch and the cameras recording car movement enter the calculation process on Sunday. This timeframe is called "long timeframe" from now on. Of course, in this case (i.e. taking a long timeframe to reset the calculation), if a car, for example, is moving from 11:50 pm on Saturday and is exposed to the sequential viewing of cameras, and its traffic continues after midnight (that is, until Sunday morning), it is better that its continuous

movement be involved in the calculation of distance traveled (using information from all cameras that see the car in this sequential movement). Therefore, in order to taking into account such cases, in addition to determining a long time frame (e.g. time value of one day), to reset the calculation, it is possible to consider a smaller time interval, for example 2-3 hours (to reset), so that if a car like the example above, is constantly moving in front of the cameras, the distance information traversed by it is properly processed. This interval is called the "short timeframe". In the above example, instead of resetting the computations on the Saturday midnight, the vehicle should be allowed to complete the route, and, after about 2-3 hours (that is, the period of a "short timeframe"), if its traffic don't be reported by the cameras, then the distance calculations can be reset and for Sunday the calculations can start again.

Applying the amount of "long timeframe" to reset computations, with one more example, becomes clearer: assume that the vehicle mentioned above is damaged in a neighborhood near Imam Khomeini Square and is taken to a repair shop. Three days later, the car was repaired and delivered to its owner. In this case, if in the first day, return path from Imam Khomeini Square to Shahran has been included in the calculation, an error has been entered in this distance calculation. In order to reduce such errors, one can, instead of one day, considers for example one week as certain car return to its neighborhood, but if this is done, another error may be entered into calculation: for example, the car may return to Shahran on the very first day, but cameras near Shahran neighborhood do not register the car for technical failures or because the car has returned from a side-road to Shahran. Therefore, it should be noted that due to the randomness of the vehicle's movement in the city (or even interurban), the calculation error cannot be zeroed in such cases, but a well estimated amount can be obtained for the distance traveled. To calculate the distance traveled by the car in the city, a few points are worth noting:

- when a car passes in front of two consecutive cameras in real time (that is, the time which takes for a vehicle with an average speed, taking into account daily traffic, almost without stopping, to travel between the two cameras), using the distance between the two cameras, we can find the amount of distance traveled by the car and confidently took that amount into account in the distance calculation.
- If only one camera (over a "long timeframe") records the car movement (which means either the car does not cross the front of the cameras or the cameras due to a

failure in the reading of the plaque number or other technical defects can't detect its passing) , you can either ignore the camera's information, or by calculating the camera's location distance from the person's neighborhood (which is accessible from the owner's or vehicle's driver's address), and then doubling the distance, obtain an estimate of the distance traveled by the car (over the "long timeframe") and add this information to the vehicle's record of traveled distance.

- If the car passes by a camera in a long timeframe, using the arrangement of the vehicle's observer cameras (which is obtained using the vehicle's observed time by the camera) we can find the distance traveled by the car. For example, in Figure 1b, if the car passes in front of the C1 and C2 and C3 cameras respectively, then the distance traveled (estimated) by the vehicle can be obtained from the following formula (the cut-off line shows the vehicle's path in this figure):

$$ED = d_{12} + d_{23}$$

- Wherein , d_{12} and d_{23} are respectively the distance between C1-C2 and C2-C3 cameras. But if the car crosses the front of the C1, C4, and C3 cameras respectively, then the distance traveled by the car is as follows:

$$ED = d_{14} + d_{34}$$

Note that the distance between the cameras is not the geometric spacing between them, but the range that is considered in terms of the path taken to move the car from one camera to another. So, given that the car should move on the street (main street or side-road) from one camera to another, the distances between cameras are calculated according to the length of the street . (These values can also be obtained from the Google Map).

Also, if there is more than one route to reach from one camera to another, then the least possible route can be taken, or the average possible paths between the two cameras can be taken into account in order to lower the error in registration of the track being traversed. (Of course, if necessary or if desired, the longest of these paths can be considered); or, randomly, select one of these paths and apply it to the calculations. Therefore, in this method, the total distance traveled by the car over a given time period is equal to the sum of the distances between the cameras

which the car passed in front of them (over this time interval, for example, one day, one month or one year). In the other words:

$$ED_1 = \sum_{i,j} d_{ij}$$

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Where:

dij: is the distance traveled between the two consecutive cameras that the car crosses in front of them. This value can be obtained from the maximum or minimum possible distance between the two cameras, the average distance between possible paths between the two cameras and / or from other mathematical functions using possible paths between the two cameras.

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The Sigma sign is a summation action, and the sum total is taken over all distances between the cameras that the car passes in front of them.

ED1: is the total path traveled by the vehicle over a given time interval which is estimated by (the system) and the formula above.

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For urban cameras, as well as road cameras, if necessary or desired, the path between the two cameras can be multiplied by a factor of 2 to allow the vehicle's return path to be considered. It is again emphasized that the above formula for calculating ED₁ can be used both for intercity and intracity distances.

Statistical method

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To estimate the distance traveled by the vehicle, other methods (for example, statistical methods) can also be used. For example, to calculate the distance traveled in the city, for simplicity of calculation, you can multiply the number of cameras that detect a car in a city in one day (minus 1) in a constant number, that is:

$$ED_2 = (N_c - 1) * d_{ave} + K$$

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Where,

Nc: The number of cameras that detect the vehicle's motion.

dave: It is also a fixed number, which can, for example, be the average (street) distance between the cameras.

315 ED₂: represents the amount of path traveled by car which is estimated by the formula presented above utilizing the cameras that record the car traffic ((city cameras to calculate intra-city distances, and out-of-town cameras to calculate intercity distances)

320 K: is also a fixed number that can, for example, be the distance between the house / neighborhood (or city, to calculate the distance traveled out of the city of the owner of the car from the first camera or it can be considered zero. (Depending on the needs, K can also take other numbers.)

325 The reason that the number 1 is reduced from the Nc value in the above formula, is that the number of distances between cameras is less than the number of the cameras by 1. (Optionally, or depending on other formulas that may be used for calculaiton, , you may decide not to reduce the number 1 from Nc)

It should be noted that the aforementioned method can be used to calculate either intra-urban or inter-urban distances.

330 As another way to calculate the distance traveled by the vehicle, after obtaining the average daily distance traveled by the vehicle, it can multiplied by 365 or in the number of working days of the year to get an average annual mileage. This method is particularly suitable for public transport vehicles. This method can be generalized and, for example, the average distance traveled by a vehicle in one month is calculated or estimated, and then this number is multiplied by twelve to obtain an annual value. In this way, the average approximate distance

traveled by the car is obtained from the following formula

$$ED_3 = A * \sum_{i=1}^M T$$

335 Where:

A: Indicates the average distance traveled by the vehicle over a specified time period (for example, one day or one month).

The value of T is also a parameter that takes the value of 1.

M is also a parameter that, for example, takes the number of days of a year, the number of months of a year, or the number of working days of the year, and so on, depending on which method (of the foregoing) is used.

Note that the above formulas for calculating the ED value can be used for estimating both the distance inside the city (ED_{city}) and outside the city (ED_{road}).

Calculating the total mileage

Thus, at the end of a period, for example, in a one-year period, the approximate distance traveled by a vehicle can be obtained from the total number of urban and interurban distances. Each of the urban or interurban distances can also be derived from the formulas given above for the ED calculation, or from the combination of the above methods. For example, to calculate intra-city distances for a public transport vehicle, for some days (e.g. working days of the year) a mean daily mileage can be considered and so the formula ED_3 can be utilized to calculate the total distance traveled in those days; and for some other days (such as holidays), ED_1 or ED_2 formulas would compute the distance traveled. In other words, you can use a mathematical function whose parameters are the distance traveled by the vehicle (ED) in different ways.

Therefore, the following formula can be used to calculate the total distance traveled by the car inside the city in a desired time interval:

$$ED_{city} = f_{city} \left(\sum ED_1 \cdot \sum ED_2 \cdot ED_3 \right)$$

Where, the data of the cameras in the city is used to calculate ED_1 , ED_2 , ED_3 .

- $f_{city}(\cdot)$ is a mathematical function that calculates the total intra-city distance traveled by the vehicle (recorded by in-city cameras).
- The sign of sigma is an summation action, and that is performed on all days when the vehicle is moving on the desired time interval (such as from the beginning of the year until the car report is requested).

Note that the proposed formula for ED3 includes calculating the distance for a specific time interval using the average distance traveled by the vehicle (for example, the average distance traveled in a day) and for a given time interval, the multiplication of this mean in the number of the corresponding days are used, and therefore in the formula above, the sigma sign is not used for ED3; However, putting it does not cause either mathematical or computational problems because, for example, using the average daily distance traveled can be used to obtain the average monthly distance (which is done with the sigma sign in the calculation of the ED3 formula), and then for the mean annual distance traveled, this value is multiplied by 12 (this can be indicated by sigma sign in the front of ED3 in formula above). Similarly, the following formula can be used to calculate the total intercity distance traveled in a given time frame (EDroad):

$$ED_{road} = f_{road}(\sum ED_1 \cdot \sum ED_2 \cdot ED_3)$$

- Where, intercity camera's data are used to calculate the ED1, ED2, ED3. The sign of the sigma is a summation action, and the function is performed on all the days the car is moving on the desired time interval (such as from the beginning of the year until the report is requested). Also:
- froad(.) is a mathematical function that calculates the total inter-city distance traveled by the vehicle (recorded by cameras outside the city)

Therefore, the following formula can be used to calculate the total distance traveled by a vehicle over a given time period:

$$ED_{Total} = B_1 * f_{road}(\sum ED_{1n} \cdot \sum ED_{2n} \cdot ED_{3n}) + B_2 * f_{city}(\sum ED_{1n} \cdot \sum ED_{2n} \cdot ED_{3n}) + B_3 * H$$

Where:

- EdTotal: Represents the entire distance traveled by the vehicle over a certain time interval (for example, from the beginning of the year until the report is requested)

- $f_{road}(\cdot)$ is a mathematical function that calculates the total inter-city distance traveled by the vehicle (recorded by cameras outside the city)

- $f_{city}(\cdot)$ is a mathematical function that calculates the total intra-city distance traveled by the vehicle (recorded by cameras inside the city)

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- The sign of the sigma is a summation action, and the function is performed on all the days the car is moving over the desired time interval (such as from the beginning of the year until the report is requested)

- H is also a fixed number whose range can be all of the numbers (usually a positive number or zero, but it can even be negative in some cases, if necessary, or desired to apply some corrections). The numbers B_1 , B_2 , and B_3 are also binary numbers that can have 0 or 1 values. These numbers are provided in the formula to involve, if desired, only one or more of the above variables in the calculation; for example, if we only want to include the inter-urban distance traveled in the calculation, we choose this values (for parameters B):

$$- \quad B_1 = 1 \quad B_2 = 0 \quad B_3 = 0$$

As another example, if we only want to involve the distance traveled inter and intra city (detected by the camera) in the calculation and do not have a constant value, we choose these values for the parameters B:

$$- \quad B_1 = 1 \quad B_2 = 1 \quad B_3 = 0$$

Also, if we choose both the values of intercity and intracity cameras, and the fixed value, we select all values of B equal to 1:

$$- \quad B_1 = 1 \quad B_2 = 1 \quad B_3 = 1$$

To consider just an approximate fixed amount to calculate the distance traveled by the vehicle (i.e., not use the camera information), we only set the value of B_3 equal to 1 and select two values of B_1 and B_2 as zero. We don't explain the other states for simplicity.

The number H is provided in the formula so that, if necessary, a constant value is added

to the total distance. This constant, for example, can be considered to be the minimum amount for the distance traveled by the car for owners / drivers of cars living in cities and villages where there is not enough plaque reader camera. This minimum value can be, for example, the minimum daily traffic' in this case, for example, this figure should be multiplied by the number of days of the year, or by the number of working days of the year, to calculate the annual mileage(to calculate the amount of traffic for public transport):

$$H = L_{min} * N_{day}$$

In which, L_{min} is the minimum daily mileage for the vehicle, and N_{day} is the number of days the vehicle is considered moving (for example, the number of days passed since the beginning of the year until the report was requested). The fixed number H can also be obtained from the sum of one or several fixed numbers. For example, you can calculate (in addition to the abovementioned values) the amount of the distance between the owner's place of residence and the first camera that registers it daily (or most of the time) in the city, and add it to H. Another point to calculate the estimated distance traveled by a car is that for cases in which the car leaves the city and travels, to record the distance between the last city camera (at the city gate and in the urban area), that records the vehicle's traffic, and the first roadside camera to see the car, the distance between the two cameras can be taken into account, or for simplicity, the latest urban camera is considered as the last urban camera, and as the first road camera ; that by this way the calculations become simpler.

The estimated number of vehicle's odometer

Therefore, the following formula can be used to estimate the number shown on the vehicle's odometer at the end of a period:

$$E_{od} = ED_{Total} + P + I$$

Where

- E_{od} , is the estimated number for the odometer (by the system and method used here).

- P is a constant number that represents the first reading of the odometer, or the first time the number of odometer is read before the system and the method presented in this invention (to estimate the odometer number) are used. For example, suppose that the system presented here is utilized from 2016. For a car that was built on 2011, and in this five year period, until the system and method presented are used, the car has travelled 50,000 kilometers, the P number should be 50,000 kilometers. This number, for example, can be read by the technician of a qualified technical inspection center who checks the car, or by the insurer or other authorities, and entered into the system. As another example, if the car is new and has recently been removed from the factory (that is, at the same time or after starting to use the system and the method presented here, the car goes out of the factory), then the number P can be set to zero and/or read by a dealer who buys/sells the car for the first time and entered into the information system.
- I is also a constant number that is used for possible corrections for ED_{Total} , and its range can be real numbers.

The parameter I is provided in the formula for possible corrections of the estimated odometer number if needed. For example, in some cases, the estimated number may be far from a reasonable amount for some reason (e.g. due to system errors). In this case, if the integrity of the number shown on the vehicle's mileage is complete, when it comes to the annual technical examination, it is possible to correct the estimated number by using the number that the parameter I takes and close it to the actual number of kilometers of the car) and / or, if desired, made them equal to each other.

General points

As stated above, in some cases, the distance traveled by the car calculated by the cameras can be multiplied by 2 to allow for taking into account the car's return path. Although this, may be simply done for roadside cameras (because, if the car owner travels, it can be expected that s/he would be returning to her/his home city within a short period of time unless s/he sells the car, or go for a long journey, or for any reason the car has been malfunctioned and would not be moved for an extended or indefinite period); but for intra-city cameras, it must be done more

carefully and all possible scenarios for not returning the car from the previous route should be taken into account. For example, for taxis and public transportation vehicles, this practice (i.e. doubling the distance calculated by camera information) may not be reasonable, because in many cases, the route of this type of vehicles is not clear. For these types of vehicles, it might be better to use other formulas, such as considering an average value for their daily mileage, and then multiply this amount in the number of days of a year or the number of working days of a year. Also, it should be noted that if the operation of doubling the path seen (by cameras) is done to calculate the distance traveled, it should not be used in calculations immediately after it was seen by the cameras (that is, if the first records of the vehicle's traffic by cameras after going in a route is in the return path), because by doubling the trip, the return path is already calculated. Also, doubling the amount of paths seen can be done in certain circumstances. For example, consider a car whose owner lives in Tehran but is seen on the Tehran-Isfahan route or in Isfahan by cameras. If the car is seen again in the next few days by the cameras on the Isfahan-Tehran route, it is possible to count the distance traveled from the Isfahan-Tehran and Tehran-Isfahan routes, or by multiplying one of these distances by 2, which in any case yields the same result. But if this car was seen only on one of these routes by cameras, and then it was seen in Tehran (without being seen in another city or without being seen on another path to Tehran (for example, Yasuj-Tehran)), this means that for some reasons the cameras have not recorded the car's return, and the operation must be doubled. Another mode that can be considered for calculating the abovementioned hypothetical road route is that the car is not seen by any of the on-road cameras, but is seen in Isfahan. In this case, the road cameras for some reasons (for example, technical defects) have not recorded the car's traffic, or the camera's registration in Isfahan was erroneous. In any case, depending on the authorities' wills (i.e., the person / decision-makers on the distance calculation protocol), a decision can be made in this regard. For example, if more than one camera (or multiple cameras) record the car in Isfahan, it would be possible to trust the camera's recorded information and determine its travel from Tehran to Isfahan and count the distance between Tehran- Isfahan in the car's history.

It should be noted that the vehicle's odometer can be read directly from the car's on-screen display and entered into the system. For example, this information can be read from the page and (along with other vehicle information) sent to the central database whenever a vehicle

is taken to a technical examination. Another embodiment of this is that the odometer information is read and entered into the system by the insurance company at the time of receiving the insurance. The information obtained from one of the above methods for obtaining the distance
505 traveled by the vehicle can then be made available to buyers, along with other information, to make it more confident to purchase the desirable car. The following describes how this process works.

Get information about vehicle technical inspection

Systems in the technical examination centers in Europe and Iran usually have sensors that
510 send measured data to a computer. This data, then, is read by the responsible person at the center and decisions are made accordingly. The problem with this kind of use of technical examination equipment data is that there is a risk of fraud and manipulation of the results by those who enter these information. Therefore, the following solution is suggested: At the examination centers, the technical examination equipment connects to a network through a computer. This computer can
515 be a typical computer (PC) (such as existing systems in the United States and Europe) or equipment that is designed for this purpose (as the smog test systems in the US). In either case, in order to reduce human intervention in the process of verifying the technical examination test, it is suggested that the information of the technical examination equipment that is measured through the sensors is sent directly to the information center via a telecommunication network so
520 that their information is processed and decides whether to approve or disapprove the relevant test (that is, whether the car would pass that test or not). If the technical examination equipment is connected to a network through a PC, it should be provided with the appropriate software and hardware (such as a network card and related software) to send the data of the sensors directly (and without additional human intervention) to the data center. In the Information (data) Center,
525 by processing this information, it is decided to whether approve the relevant test or not. After processing all the relevant vehicle information (some of which can be entered manually and through the computer and sent to the information center, such as the condition of the windshield wiper, the glass, the general condition of the vehicle, etc.), if all tests were positive, the result of the technical inspection of the car is confirmed. This result can be electronically stored in the
530 car's history, printed on paper and sent to the owner of the car, and/or sent to the technical examination center to be used if necessary (for example confirmation sheet to be printed there).

The result of this verification also remains in the vehicle's history in the database to be able to fine vehicles which lack a technical examination approval (or one of the official documents, such as registration / insurance confirmation approvals, etc.) and their movement or working is detected by the camera. As an example, a method of using the system is given below (obviously this is an example of the application of the system and has no limiting aspect at all):

An example of the Invention Practice:

As shown in Figure 1.a, the user (e.g. the subscriber or buyer who wants to use this service) is connected to the appropriate website via a personal computer (for example, a website at www.khistory.ir) and when pays a certain amount he/she becomes a member of this website and is given a username and password. Then the website allows the user to enter one of the specifications of the desired vehicle after entering the username and password (such as VIN number, engine number, and / or license plate number, etc.) and in this way, he/she can see the information on that car on its personal computer screen and print or save it if necessary.

People can subscribe the service in multiple ways:

- *On a daily basis:* A subscriber can use this service with a specified amount for one or more days and by entering the information of the vehicles (such as the VIN Number, the license plate number and / or engine number, etc.) to access the vehicle history.
- *The specified number of cars:* In this way, a subscriber by paying a certain amount of money can use the system for certain times ((for example, by paying x\$, he can check the identity of 10 cars)
- As a combination of the above: for example, a subscriber by paying a certain amount of money can use the system for example for 3 days and for up to 10 cars and find the history of its favorite vehicles.

Also, some information may require a higher price. Therefore, another way to become a member is to use a certain number of vehicles and / or a certain number of days, and / or a certain number of reports, and / or a combination of all of these. Some of the vehicle information that can be made available to the customer on the website are (obviously, these are just some of the information about the car, and have no limiting aspect at all):

- 560
 - The date the vehicle was released from the factory or entered the country (for imported cars)
 - The date of purchase and sale of vehicles and the location of these operations
 - Car owners in the sense that they were real or legal persons (such as a business, a company, a rental company or leasing company)
- 565
 - Date of replacement of the license plaque and number of these plaques (if this information is not confidential)
 - The years when the car has gone through a technical examination and smog test, as well as the result of these tests (that is, whether the vehicle was accepted in this test or not)
- 570
 - The date of the car's major accident and the type of problem that the car finds in the accident (although minor crashes can be included, as well as the amount of damage and the type of damage that was brought to the car)
 - Number of probable victims who have been injured or died in major car accidents and type of their injury.
- 575
 - The original or important related parts of the vehicle and the dates of these replacements
 - Status / Replacement or bursting of the airbag.
 - The condition of the car when it leaves the car factory (in terms of whether the car was a lemon or not(some of the cars are known as "lemon" and that point out to cars
- 580
 - that, when leaving the factory, have one or more technical problems which can't be eliminated. These cars are cheaper than the rest of the cars.)
 - The distance traveled by the car: this value can be in different forms, such as the mileage per year, the average annual mileage, the distance traveled on the date of
- 585
 - each purchase or sale, or in special situations such as crash situations, etc. , this value can be obtained in one of the ways mentioned above. Also, the car traveled distance

which is calculated by the inter- or intra-city cameras,. can be provided to the customer

- vehicle odometer value, which, for example, is read at the Technical Examination Center on an annual visit.

590 Note that some of the above information may be considered confidential (such as the Vehicle license plate) and is not available to the customer. Also, an access level can be defined for some confidential information and make them available to specific individuals, such as police officers. Some of the information above can also be provided to the customer at a higher price. Information can also be provided in a number of different ways to the customer, for example, in
595 the form of a summary of the most important points, and then the vehicle information in more detail. The other point (as already mentioned) is that since the estimated number by the system and the method presented here in any case would be accompanied by some error, this error can be corrected using the actual number read from the vehicle's odometer and entered into the system every once in a while if needed (for example, replacing it with the real odometer
600 reading). This is better to be done if the actual number of the odometer is not far from the estimated number, so as to ensure that the odometer is correct and has not been manipulated. The other point is that the calculated distance traveled by the car for city/road or villages can be presented to the potential customers separately.

605 The following is a hypothetical example of information that the service can provide to the customer.

Example (The date of receipt of the report is assumed to be 2015-09-23):

Car Specs:	
Type of vehicle:	passenger
System	Peugeot
Type	206 Arian
Color	White
Model	2008
Fuel Type:	Petrol
Capacity:	A total of 4 people
Cylinder number:	4
Axis number:	2
Number of wheels:	4
chassis number:	AAAA11AA1AA111111

Engine Number:	۳۳۳۳۳۳۳۳۳۳
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Information on vehicle sales and the distance traveled by car	First owner	Second owner	Third owner
Car purchase history			
Place of residence of the owner	Tehran	Tehran	Isfahan
Type of ownership	Corporative	Personal	Personal
Odometer number when buying (km)	20	45000	110000
The average annual distance traveled by the owner(by reading odometer)	15000	21666	14000
Estimated distance traveled obtained from the cameras	43000	105000	130000
Estimated average annual distance traveled obtained from the cameras (by the owners)	14333	20666	8333

Vehicle history information	First owner	Second owner	Third owner
Airbag information Changed once	-	Airbags Changed	-
Crash (On 7/7/2010 had a major accident	Had a major accident	No	No
Pollution problem	No	Yes	No
Replacing the engine	Yes	No	No
Chassis replacement	No	No	No
Changing room	No	No	No
The odometer problem Odometer tampering or defect have not been reported	No	No	No
As scrap / salvage / outdated	No	No	No
As effete	No	No	No
Car recall by the manufacturer	No	No	No
Warranty	Yes	Finished	Finished

Technical tests	Pollution	Odometer number	Auxiliary spring	Brakes	Re-coloring	Wheel angle
Date						
2009	-	-	-	-	-	-
2010	Confirmed	31000	Confirmed	Confirmed	Painted (white)	Confirmed
2011	Confirmed	45000	Confirmed	Confirmed	No	Confirmed
2014-04-13	Rejected	67000	Rejected	Confirmed	No	Confirmed
2014-04-18	Confirmed	67050	Confirmed	Confirmed	No	Confirmed
2013-04-09	Confirmed	88500	Confirmed	Rejected	No	Rejected
2014-04-16	Confirmed	89000	Confirmed	Confirmed	NO	Confirmed

2015	Confirmed	109500	Confirmed	Confirmed	No	Confirmed
2016	Confirmed	124000	Confirmed	Confirmed	No	Confirmed

610

Technical tests (Continued)	Lighting system	Suspension components	Audio standard	Body deformation
Date				
2009	-	-	-	-
2010	confirmed	confirmed	confirmed	No
2011	confirmed	confirmed	confirmed	No
2012	confirmed	confirmed	confirmed	No
2012	confirmed	confirmed	confirmed	No
2013	confirmed	confirmed	confirmed	No
2013	confirmed	confirmed	confirmed	No
2014	confirmed	confirmed	confirmed	No
2015	confirmed	confirmed	confirmed	No

Other Vehicle Information	Annual service	Third party insurance	Replacing the engine	Chassis replacement	Changing room
2009	Done	Yes	No	No	No
2010	Done	Yes	Yes	No	No
2011	Done	Yes	No	No	No
2012	Done	Not from 2012-05-21 to 2012-08-22,	No	No	No
2013	Done	Yes	No	No	No
2014	No	Yes	No	No	No
2015	No	Yes	No	No	No

Car history details	Description	Source	Odometer reading	The estimated number of the odometer obtained by the system and method of the invention
2008-04-03	Factory released	Iran Khodro Factory	0	-
2008-04-05	offered for sale	Representative No. 1 of Tehran	20	-
2008-04-17	Sold	Representative No. 1 of Tehran	20	20
2008-04-20	Title Transfer Done.	Tehran traffic police	30	28
2008-04-21	plaque was replaced.	Tehran traffic police	45	40
2009-04-18	Annual service	Representative No.	15000	14500

	was performed.	1 of Tehran		
2010-04-04	Annual service was performed.	Representative No. 1 of Tehran	30600	30000
2010-04-14	Technical examination performed: confirmed	Beihaqi Technical Examination Center – Tehran	31000	30200
2010-09-29	Major crash reported.	Tehran-Karaj Highway / Police report	-	37500
2010-10-22	The engine was replaced	Representative No. 1 of Tehran	-	-
2010-10-30	Carving the new number on the engine	Representative No. 1 of Tehran	39000	-
2011-04-14	Technical examination performed: confirmed	Beihaqi Technical Examination Center – Tehran	45000	43500
2011-06-23	sold	Auto Show No. 10, Motahari St, Tehran	49000	47000
2011-06-24	Document Transmission Done.	Tehran traffic police	49100	47100
2011-06-25	the plaque was replaced.	Tehran traffic police	49200	47200
2014-04-13	Technical examination performed: rejected	Beihaqi Technical Examination Center – Tehran	67000	64500
2014-04-18	Technical examination performed: confirmed	Beihaqi Technical Examination Center – Tehran	67050	64550
2013-04-09	Technical examination performed: rejected	Beihaqi Technical Examination Center – Tehran	88500	85800
2013-04-14	Annual service was performed.	Representative No. 1 of Tehran	88700	85700
2013-04-16	Technical examination performed: confirmed	Beihaqi Technical Examination Center – Tehran	89000	86000
2014-04-19	Technical examination performed: confirmed	Niayesh Technical Examination Center- Tehran	109500	106000

2014-08-25	Sold	Auto Show No. 10, Motahari St, Tehran	117000	113500
2014-08-26	Title Transfer Done.	Tehran traffic police	117050	113540
2014-08-27	the plaque was replaced.	Tehran traffic police	117070	113560
2015-04-17	Technical examination performed: confirmed	Parvin Technical Examination Center- Isfahan	120000	116000

It should be noted that the car information exists in databases only if reported by car owners,
615 insurers or law enforcement agencies, manufacturers, etc. So, for example, if there is a major
accident that has not been reported to the insurance company by the car owners, and not by the
law enforcement agency, this information will not be included in the vehicle identification, and
the vehicle purchaser will remain unaware of it.

Using this system, buyers can more safely buy a car because many of the important vehicle
620 information is collected and provided to them. In this way, the risk of fraud in car sales becomes
very low.

In this way, buyers can more safely buy a car , and the possibility of fraud in the purchase and
sale, as well as manipulation of the number of odometer is eliminated or minimized. Similarly,
the relevant authorities can obtain their desired information using this system. The application of
625 this method is to provide information on the status and history of vehicles to their potential
buyers and other interested persons (such as authorities, police, authorities, etc.). The method and
system provided in this invention provide a great deal of information about car and its history to
car customers and other interested persons.

630

1. A method, for anti-manipulation of an odometer in a vehicle when providing car fact sheet to a buyer, comprising:
Detecting and therefore registering said vehicle citing by traffic control cameras throughout a city or state or interstate through a predetermined time frame, wherein said cameras are spread out in said city, state and/or interstate; and each of said cameras have their unique code; transferring said citing to an access system data base; processing an acquired data from said access system database per each vehicle, calculating a distance travelled by said vehicle in said time frame.
2. The method of claim 1, wherein said access system data base comprises data gathered and stored from different database, comprising but not limited to data received from insurance companies, inspection, police records and other organizations.
3. The method of claim 2, wherein said gathered data comprises but not limited to information of vehicle history, ownership history (rental, personal, commercial, lease), selling date, smog/inspection test results, collision history, theft history, a list of replaced main parts of said vehicle and/or any data provided to said buyer via a website.
4. The method of claim 3, wherein said gathered information can be provided as a fact sheet to any person of interest such as but not limited to said buyers of said vehicle, companies and/or auto-dealers, agencies, companies and/or other organizations interested in said vehicle and/or said buyer.
5. The method of claim 4, wherein said person of interest can access said gathered data via said website by paying a fee; wherein said fee may be a limited time subscription, a membership, a onetime access, and/or a predetermined number of access dependent on a number of said fact sheets being accessed to and/or other forms of said access and fee calculation methods.
6. The method of claim 5, wherein one of said data provided to said person of interest comprises readings from an odometer of said vehicle; wherein said reading can be checked and entered in said access system data base via car inspection companies, smog/inspection agent, insurance companies, related organizations or their authorities and/or an owner of said vehicle as said fact sheet; wherein a first time that said reading is stored in said access system is a fixed and unchangeable Od_0 number; wherein said other readings of said vehicle odometer will be stored in said access system as Od_m wherein $m \geq 1$ and said "m" increases by increments of "m" per each of said reading.
7. The method of claim 6, wherein said access system comprises means and method of estimating said vehicle's odometer reading named E_{od} ; based on said detection of said vehicle by said cameras within said time frame and said calculations of said distance travelled by said vehicle.
8. The method of claim 7, wherein said time frame is reset on a predetermined time, wherein this reset time may be but not limited to every few hours, at a certain time of day, daily (at

the end of each day and/or midnight) or every few days; wherein within said time frame a last observed movement (last reading) of said vehicle by said camera before said reset time is considered as a first recognition of said vehicle for a beginning of a new consecutive time frame (for example the next day) of estimating a traveled distance, therefore said traveled distance between said last reading and a first reading (next recognition of said vehicle movement by said cameras) after said reset time will be considered as first ED (an estimate distance traveled by said vehicle in said time frame) of said consecutive time frame; wherein said reset time is predetermined which can be changed according to local, city, province, and intercity requirements.

9. The method of claim 8, wherein said access system comprises of equipment (computers, CPUs, tablets, and/or any means capable of processing said gathered data) necessary to calculate said distance traveled by said vehicle (ED), wherein said time frame can be but not limited to an hour, half day, daily.
10. The method of claim 9, wherein said ED can be calculated via a first method by the following equation:

$$ED_{1n} = \sum_{i,j} d_{ij}$$

Wherein:

- ED_{1n} is an estimated distance traveled by said vehicle in said time frame between two cameras detecting said vehicle motion consecutively
- d_{ij} is an actual distance between said two cameras; wherein said d_{ij} can be a shortest and/or longest distance possible to travel between said two cameras, and/or an average of distances calculated between all possible routes to travel between said two cameras and/or other means of calculation of said distance via said access system
- n is a numerical code which includes a code to detect said time frame and date in which it was calculated at
- Σ denotes summation operator, wherein the summation is done over all said cameras which detect said vehicle in said time frame.

11. The method of claim 10, wherein said ED can be calculated via a second method as follows:

$$ED_{2n} = (N_c - 1) * d_{ave} + K$$

Wherein:

- ED_{2n} is an estimated distance traveled by said vehicle in said time frame detected by two sets of cameras consecutively
- N_c is the number of said cameras which detects said vehicle in said time frame
- D_{ave} is a numerical constant which comprises an average street distance between said cameras or any other relations between said cameras

- K is a numerical constant which comprises a distance between home/neighborhood of said vehicle owner and said first camera and/or it can be considered zero
 - n is a numerical code which includes a code to detect said time frame and date in which it was calculated at.
12. The method of claim 11, wherein said ED can be calculated via a third method as follows: after calculating a distance traveled by said vehicle in said time frame, said distance will be multiplied by a constant (such as 365 for a year, or a number of non-holiday days in a year, or another predetermined number depending on said time frame) resulting in a distance traveled by said vehicle during a specific time frame; said constant number can be generalized to shorter time periods (a month or several months); also an estimated average traveled distance by said vehicle during a month can be calculated and then multiplied by twelve to determine an annual estimated ED; said ED is calculated using the following formula.

$$ED_{3n} = A * \sum_{i=1}^M T$$

In which:

- A indicates an average traveled distance by said vehicle during said time frame (one day, one month, multiple months and/or a year).
 - T is a parameter which has the value of 1
 - M can be: number of days in a year, number of months in a year, and/or number of non-holiday days in a year; wherein it can change depending on the method being used
 - ED_{3n} declares said estimated traveled distance by said vehicle
 - n is a multidigit code which includes a key for recognizing said time frame and date in which it was calculated at.
13. The method of claim 12 in which ED_{Total} can be calculated through the following method:

$$ED_{Total} = B_1 * f_{road} \left(\sum ED_{1n} , \sum ED_{2n} , ED_{3n} \right) + B_2 * f_{city} \left(\sum ED_{1n} , \sum ED_{2n} , ED_{3n} \right) + B_3 * H$$

In which:

- ED_{Total} indicates a total traveled distance by said vehicle in a certain time frame (for example from beginning of a year until a time of getting said report)
- f_{road} is a mathematical function which calculates said total traveled distances out of said town by said vehicle (which have been detected by road cameras located out of city) in said time frame

- f_{city} is a mathematical function which calculates said total traveled distances in said city by said vehicle (which has been detected by city cameras located inside said city) in said time frame
- H is a constant number where its domain is a set of all real numbers (usually this number is positive or zero, but in some cases, if necessary or desired, it can be regarded negative in order to make some corrections).

Wherein H can be calculated using the following method:

$$H = L_{min} * N_{day}$$

- L_{min} is a minimum daily traveled distance considered for said vehicle, and N_{day} is a number of said days of said year which are spent until said time of getting said report, wherein said vehicle is considered mobile
 - B_1, B_2, B_3 are binary numbers which can have values of 0 and/or 1.
14. The method of claim 13, in which said E_{od} is defined as an estimated value of said vehicle's odometer reading which can be calculated through the following method:

$$E_{od} = ED_{Total} + I + P$$

In which:

- ED_{Total} indicates said total traveled distance by said vehicle in a specific time frame (from a time of selling said vehicle until said time of getting said report).
 - P is a constant number and it is a first number related to said vehicle which is stored in a database of said access system
 - I is also a constant number which is used for probable corrections about ED_{Total} and its range can include all real numbers.
15. The method of claim 14 in which said ED_{Total} and/or said E_{od} are calculated whenever a page containing an information of said vehicle (CarID) is requested by said buyer, responsible person and/or other interested individuals (person of interest); wherein said CarID, E_{od} is presented to said person of interest according to an access level.
16. The method of claim 15 in which said access level can include but not limited to each of the following: access for one day (or a few days) for printing said CarID report which is offered to said person of interest in return for said fee paid, and for a limited number of said CarID reports which is also offered in return for a certain payment, or a combination of the two methods in which said access for printing said CarID report is hierarchical and

is based on authority level and it can include all or some of said vehicle's information such as ED_{Total} .

17. The method of claim 16 in which said Car ID report can be observed, printed and/or sent through different ways such as but not limited to the following: personal PCs/laptops, different websites like police websites, car dealers' websites, police offices, cell phones, tablets, smart systems, smart watches or any kind of personal or social communication devices which are usable through existing communication protocols not limited to Internet, Wifi systems, SMS, E-mails, different applications, social networks (telegram, whatsapp and/or similar applications); also, said Car ID report can be sent to a printer from different devices (similar to said above mentioned devices) and printed on a paper.
18. The method of claim 17 in which said Car ID report page can include the following information (but not limited to these): release date of said vehicle, a date of cases of selling and buying said vehicle, place of selling and buying, information of present and former owners of said vehicle, license plate replacement date and license plate numbers, inspection and smog tests history, accidents and repairs and replacements history, driving record , condition of said vehicle at a time of release, vehicle facilities including options and changes made by former owner such as sound and stereo system and new covers, and also estimating a mileage through said abovementioned methods and numbers registered in said database.
19. The method of claim 18 in which said Car ID report and information can change according to said access level offered to said person of interest.
20. A system for detecting odometer manipulation of a vehicle and reporting such; to a buyer (or person of interest) in a page containing all of said vehicle's information, comprising:

A number of traffic control cameras located at different places throughout cities and roads of a country, each one of said cameras comprising at least a transmitter and a camera telecommunication interface for sending and receiving information, and can detect said vehicle and/or any other moving transportation unit in their scope; said camera telecommunication interface sends information of said vehicle in addition to a unique access code of each one of said cameras that has detected said vehicle to an access system database; wherein said system further comprises:

- a. inspection equipment for vehicle inspection
- b. Main telecommunication unit having an access system, receiving said information from said camera telecommunication interface
- c. An inspection data processing unit and an inspection memory unit
- d. A main data processing unit and a main memory unit
- e. An information reporting unit

Wherein said main data processing unit, based on said information received from said cameras, inspection data and said information reporting unit, and by extracting and comparing all of the aforementioned data, detects and reports any vehicle without inspection test confirmation.

21. The system of claim 20, wherein data received from said inspection data processing unit, said inspection memory unit and said information reporting unit are all saved and stored at a data center; wherein said data center monitors, categorizes, processes and compares different said received and stored data.
22. The system of claim 21, wherein said main inspection data processing units receiving said data are located at different offices of but not limited to traffic police department, insurance office, municipality, environment department and other institutes interested in said vehicle.
23. The system of claim 22, wherein said data (of the inspection tests) received by said data center is transmitted from inspection examination centers via different types of data transferring means but not limited to telecommunication interfaces; hard disks, memory disks, CDs, DVDs and WIFI, satellite communication lines, Wireless, Internet and/or any other means capable of transferring data from one location to another location; and wherein said data received comprises but is not limited to inspection information of said vehicle comprising, but not limited to, status of wheels, engine, brakes, smog and the odometer readings, accidents, paint job and/or similar data related to said vehicle; and car ID information comprising but not limited to said vehicle's VIN number, plate number, chassis number; owner information comprising name, address, ID number, insurance policy information and/or other relatable information about said vehicle's owner.
24. The system of claim 23, wherein said received information (from inspection examination centers) can be raw, processed, and/or categorized.
25. The system of claim 24, wherein said access system data base comprises data gathered and stored from different database, comprising but not limited to data received from insurance companies, inspection, police records and other organizations.
26. The system of claim 25, wherein said gathered data comprises but not limited to information of vehicle history, ownership history (rental, personal, commercial, lease), selling date, smog/inspection test results, collision history, theft history, a list of replaced main parts of said vehicle and/or any data provided to said buyer via a website.
27. The system of claim 26, wherein said gathered information can be provided as a fact sheet to any person of interest such as but not limited to said buyers of said vehicle, companies and/or auto-dealers, agencies, companies and/or other organizations interested in said vehicle and/or said buyer.

28. The system of claim 27, wherein said person of interest can access said gathered data via said website by paying a fee; wherein said fee may be a limited time subscription, a membership, a onetime access, and/or a predetermined number of access dependent on a number of said fact sheets being accessed to and/or other forms of said access and fee calculation methods.
29. The system of claim 28, wherein one of said data provided to said person of interest comprises readings from an odometer of said vehicle; wherein said reading can be checked and entered in said access system data base via car inspection companies, smog/inspection agent, insurance companies, related organizations or their authorities and/or an owner of said vehicle as said fact sheet; wherein a first time that said reading is stored in said access system is a constant Od_0 number; wherein said other readings of said vehicle odometer will be stored in said access system as Od_m wherein $m \geq 1$ and said “m” increases by increments of “1” per each of said reading.
30. The system of claim 29, wherein said access system comprises means and method of estimating said vehicle’s odometer reading named E_{od} ; based on said detection of said vehicle by said cameras within said time frame and said calculations of said distance travelled by said vehicle.
31. The system of claim 30, wherein said time frame is reset on a predetermined time, wherein this reset time may be but not limited to every few hours, at a certain time of day, daily (at the end of each day and/or midnight) or every few days; wherein within said time frame a last observed movement (last reading) of said vehicle by said camera before said reset time is considered as a first recognition of said vehicle for a beginning of a new consecutive time frame (for example the next day) of estimating a traveled distance, therefore said traveled distance between said last reading and a first reading (next recognition of said vehicle movement by said cameras) after said reset time will be considered as first ED (an estimate distance traveled by said vehicle in said time frame) of said consecutive time frame; wherein said reset time is predetermined which can be changed according to local, city, province, and intercity requirements.
32. The system of claim 31, wherein said access system comprises of equipment (computers, CPUs, tablets, and/or any means capable of processing said gathered data) necessary to calculate said distance traveled by said vehicle (ED), wherein said time frame can be but not limited to an hour, half day, daily.
33. The system of claim 32, wherein said ED can be calculated via a first method by the following equation:

$$ED_{1n} = \sum_{i,j} d_{ij}$$

Wherein:

- ED_{1n} is an estimated distance traveled by said vehicle in said time frame between two cameras detecting said vehicle motion consecutively
- d_{ij} is an actual distance between said two cameras; wherein said d_{ij} can be a shortest and/or longest distance possible to travel between said two cameras, and/or an average of distances calculated between all possible routes to travel between said two cameras and/or other means of calculation of said distance via said access system
- n is a numerical code which includes a code to detect said time frame and date in which it was calculated at
- Σ denotes summation operator, wherein the summation is done over all said cameras which detect said vehicle in said time frame.

34. The system of claim 32, wherein said ED can be calculated via a second method as follows:

$$ED_{2n} = (N_c - 1) * d_{ave} + K$$

Wherein:

- ED_{2n} is an estimated distance traveled by said vehicle in said time frame detected by two sets of cameras consecutively
- N_c is the number of said cameras which detects said vehicle in said time frame
- d_{ave} is a numerical constant which comprises an average street distance between said cameras or any other relations between said cameras
- K is a numerical constant which comprises a distance between home/neighborhood of said vehicle owner and said first camera and/or it can be considered zero
- n is a numerical code which includes a code to detect said time frame and date in which it was calculated at.

35. The system of claim 32, wherein said ED can be calculated via a third method as follows: after calculating a distance traveled by said vehicle in said time frame, said distance will be multiplied by a constant (such as 365 for a year, or a number of non-holiday days in a year, or another predetermined number depending on said time frame) resulting in a distance traveled by said vehicle during a specific time frame; said constant number can be generalized to shorter time periods (a month or several months); also an estimated average traveled distance by said vehicle during a month can be calculated and then multiplied by twelve to determine an annual estimated ED; said ED is calculated using the following formula.

$$ED_{3n} = A * \sum_{i=1}^M T$$

In which:

- A indicates an average traveled distance by said vehicle during said time frame (one day, one month, multiple months and/or a year).
- T is a parameter which has the value of 1
- M can be: number of days in a year, number of months in a year, and/or number of non-holiday days in a year; wherein it can change depending on the method being used
- ED_{3n} declares said estimated traveled distance by said vehicle
- n is a multidigit code which includes a key for recognizing said time frame and date in which it was calculated at.

36. The system of claim 32 in which ED_{Total} can be calculated through the following method:

$$ED_{Total} = B_1 * f_{road}(\sum ED_{1n}, \sum ED_{2n}, ED_{3n}) + B_2 * f_{city}(\sum ED_{1n}, \sum ED_{2n}, ED_{3n}) + B_3 * H$$

In which:

- ED_{Total} indicates a total traveled distance by said vehicle in a certain time frame (for example from beginning of a year until a time of getting said report)
- f_{road}(.) is a mathematical function which calculates said total traveled distances out of said town by said vehicle (which have been detected by road cameras located out of city) in said time frame
- f_{city}(.) is a mathematical function which calculates said total traveled distances in said city by said vehicle (which has been detected by city cameras located inside said city) in said time frame
- H is a constant number where its domain is a set of all real numbers (usually this number is positive or zero, but in some cases, if necessary or desired, it can be regarded negative in order to make some corrections)

Wherein H can be calculated using the following method:

$$H = L_{min} * N_{day}$$

- L_{min} is a minimum daily traveled distance considered for said vehicle, and N_{day} is a number of said days of said year which are spent until said time of getting said report, wherein said vehicle is considered mobile
 - B₁, B₂, B₃ are binary numbers which can have values of 0 and/or 1.
37. The system of claim 36, in which said Eod is defined as an estimated value of said vehicle's odometer reading which can be calculated through the following method:

$$E_{od} = ED_{Total} + I + P$$

In which:

- ED_{Total} indicates said total traveled distance by said vehicle in a specific time frame (from a time of selling said vehicle until said time of getting said report).
 - P is a constant number and it is a first number related to said vehicle which is stored in a database of said access system
 - I is also a constant number which is used for probable corrections about ED_{Total} and its range can include all real numbers.
38. The system of claim 37 in which said ED_{Total} and/or said E_{od} are calculated whenever a page containing an information of said vehicle (CarID) is requested by said buyer, responsible person and/or other interested individuals (person of interest); wherein said CarID, E_{od} is presented to said person of interest according to an access level.
39. The system of claim 38 in which said access level can include but not limited to each of the following: access for one day (or a few days) for printing said CarID report which is offered to said person of interest in return for said fee paid, and for a limited number of said CarID reports which is also offered in return for a certain payment, or a combination of the two methods in which said access for printing said CarID report is hierarchical and is based on authority level and it can include all or some of said vehicle's information such as ED_{Total} .
40. The system of claim 39 in which said Car ID report can be observed, printed and/or sent through different ways such as but not limited to the following: personal PCs/laptops, different websites like police websites, car dealers' websites, police offices, cell phones, tablets, smart systems, smart watches or any kind of personal or social communication devices which are usable through existing communication protocols not limited to Internet, Wifi systems, SMS, E-mails, different applications, social networks (telegram, whatsapp and/or similar applications); also, said Car ID report can be sent to a printer from different devices (similar to said above mentioned devices) and printed on a paper.
41. The system of claim 40 in which said Car ID report page can include the following information (but not limited to these): release date of said vehicle, a date of cases of selling and buying said vehicle, place of selling and buying, information of present and former owners of said vehicle, license plate replacement date and license plate numbers, inspection and smog tests history, accidents and repairs and replacements history, driving record , condition of said vehicle at a time of release, vehicle facilities including options and changes made by former owner such as sound and stereo system and new covers, and also estimating a mileage through said abovementioned methods and numbers registered in said database.
42. The system of claim 41 in which said Car ID report and information can change according to said access level offered to said person of interest.

43. A new method for presenting Car ID information to a requester comprising the steps of:

Gathering stored information of each vehicle chosen by said requester (or person of interest) from different databases including but not limited to data received from insurance companies, traffic control cameras, inspection examination centers, Police department information, authorized car dealers, authorized repair shops, and/or other organizations having information for said vehicles; processing said received data of each of said vehicles according to an authority level of said requester and presenting a processed information according to a predetermined screening option to said requester.

44. The method of claim 43, wherein said gathered information comprises but is not limited to history record, ownership (personal, company, rental) information, accident record, theft record, a list of replaced original pieces and/or any information stored and recorded for said vehicle; and any information related to said vehicle and inspection information comprising but not limited to status of wheels, engine, brakes, smog, odometer reading; and car ID information comprising but not limited to vehicle plate number, chassis number; wherein said ownership information comprises but not limited to individual/company name, address, ID number, and insurance policy information; wherein said gathered information is stored at a central unit.

45. The method of claim 44, wherein based on a request and said authority level of said requester, a part of or all of said gathered information will become available to said requester on an information page; wherein said page can be a soft or hard copy; wherein said requester comprises but not limited to any buyer of each of said vehicles, car agencies, car dealers, car exhibitions, companies, Police department, and other authorities and centers.

46. The method of claim 45, wherein said requester can access to said gathered information with a certain and predetermined charge; wherein said charge can be considered for a limited time subscribe, and/or a onetime only access, and/or a certain number of access based on said charge, and/or access to said gathered information of a limited number of each one of said vehicles, and/or other forms of access based on a predetermined and/or predetermined calculation system that can be edited and rest based on each request and said authority level.

47. The method of claim 46, wherein data screening of said information page comprises but is not limited to direct visual observation, printing, and/or transmitting said page through different ways of communication comprising but not limited to said requester's PC, different websites comprising but not limited to traffic Police websites, car dealer websites, and/or Police department computers, and/or cell phones, and/or hard disks and/or smart disks, and/or tablets, and/or smart systems, and/or smart watches, and/or any kind of

personal or social communication devices which are available at time of use through existing communication protocols comprising but not limited to Internet, WIFI systems, SMS, MMS, E-mails, different applications, social networks (Telegram, Whatsapp and/or other known and fully functional social networks at the time of use) and/or mass communication systems (TV); wherein said hard copy is achieved via any type of known printers capable of receiving and printing said information page.

48. The method of claim 47, wherein said authority level of said requester is determined according to a predetermined coding; wherein based on said coding and said type of aforementioned access said gathered information or part of it will be displayed for said requester, wherein said owner information may not be available to all of said requesters.

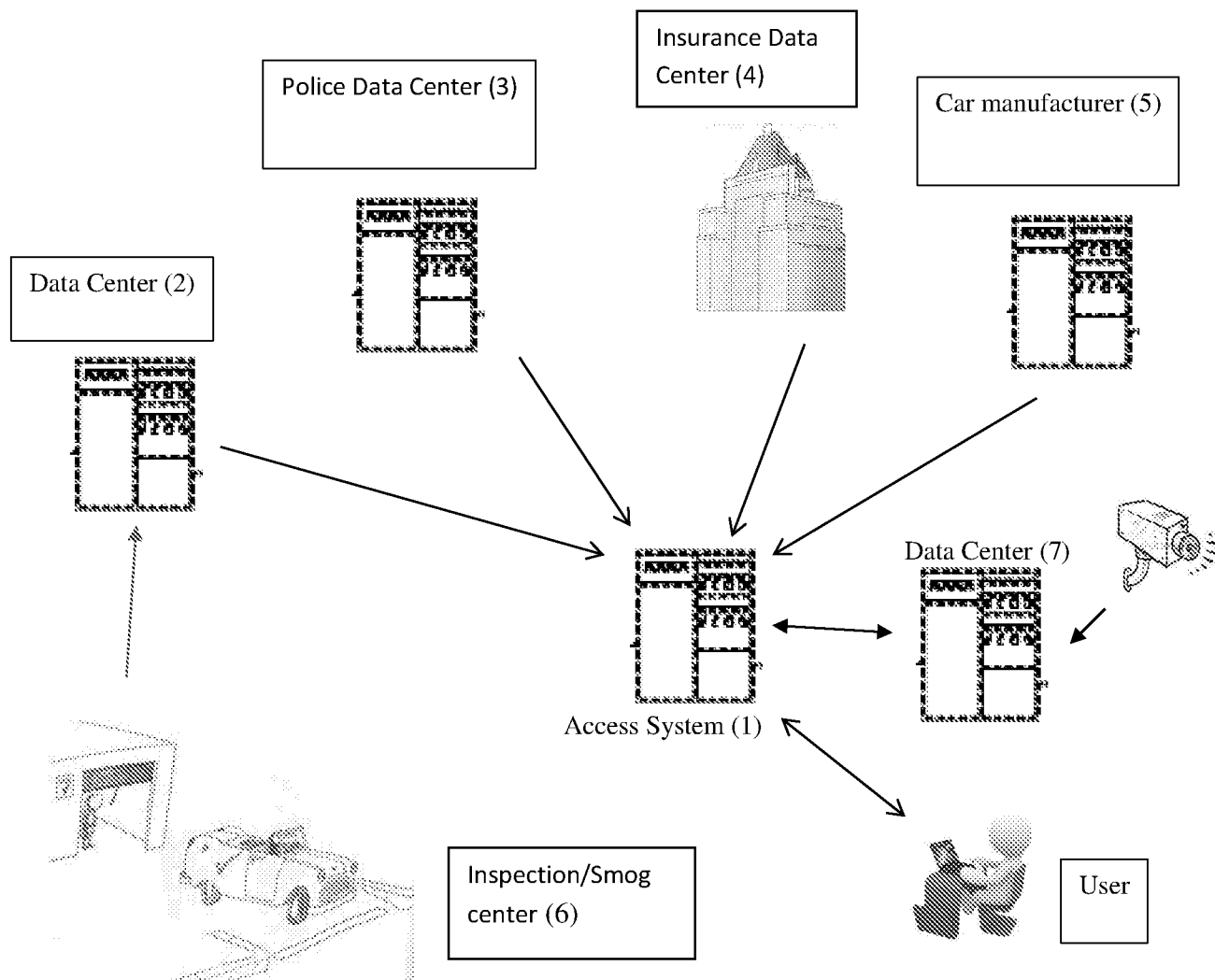


Fig. 1a: Block diagram of the system

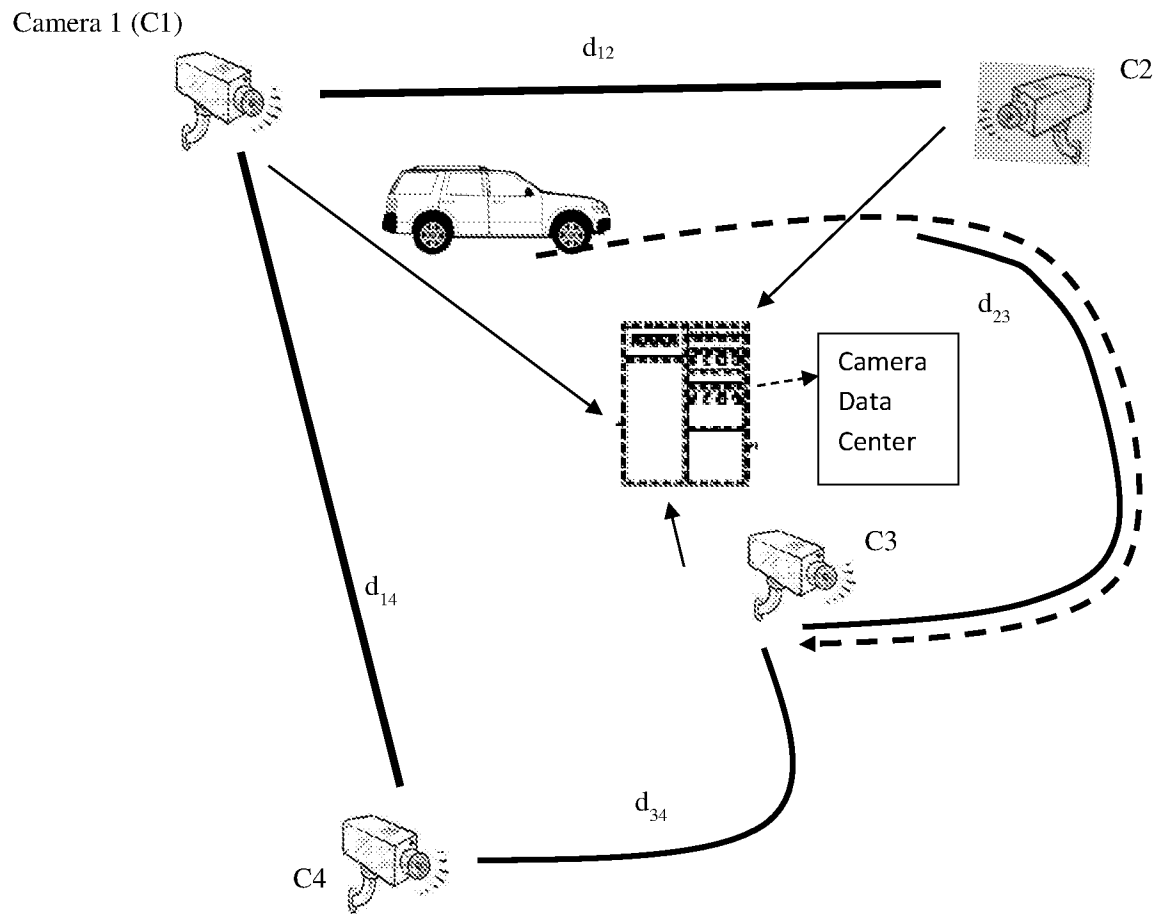


Fig. 1b

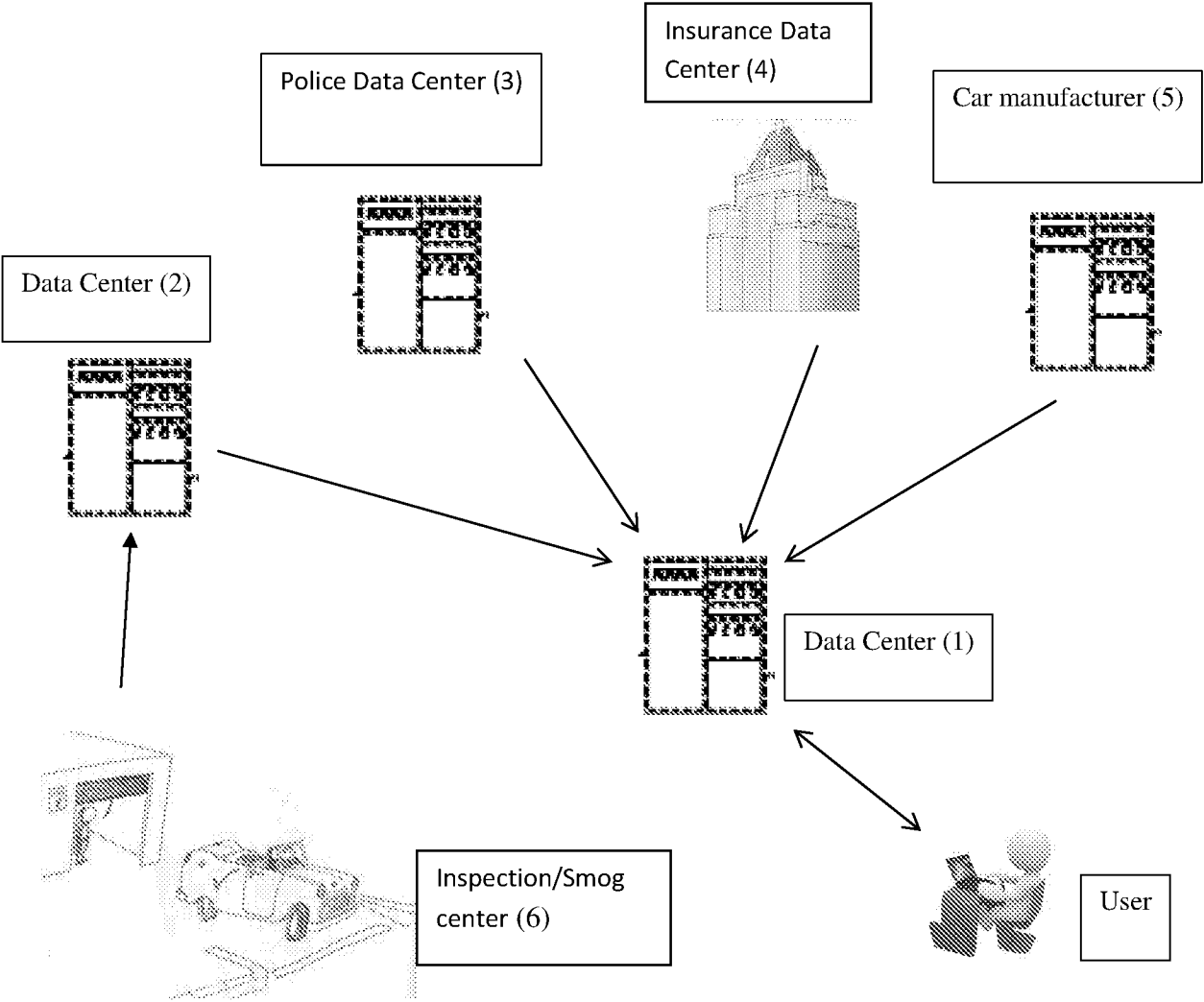


Fig. 1c

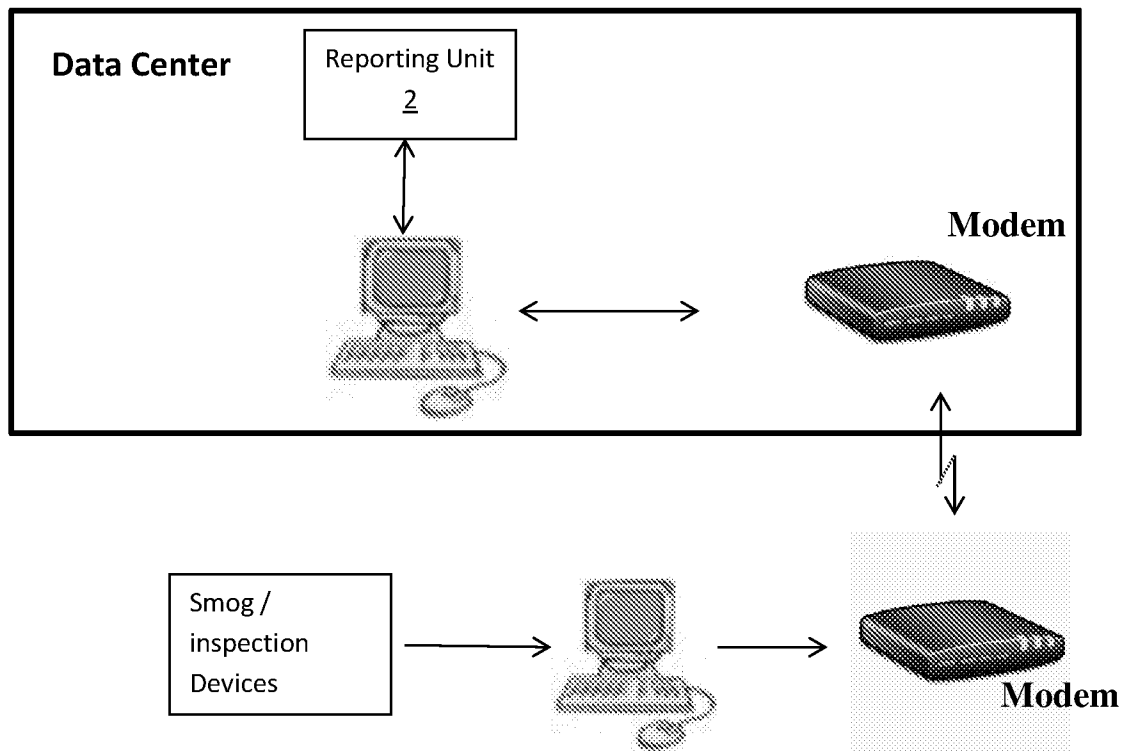


Fig. 1d

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2017/057545

A. CLASSIFICATION OF SUBJECT MATTER

G06F17/30, G06Q10/00, G08G1/01, G01C22/00 Version=2018.01

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)

G06F, G06Q, G08G, G01C

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)

Databases: Patseer, IPO Internal Database

Keywords: odometer, camera, insurance

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN102778238 A(KAI Zhang et al.)14 November 2012 (Abstract, Claims 1-3, Paragraphs 4, 6-10 and 14)	1-48
Y	US20160162852 A1(WINIECKI Kenneth Carl Steffen)9 June 2016 (Abstract, Paragraphs 4 and 37)	1-48



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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

09-02-2018

Date of mailing of the international search report

09-02-2018

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Indian Patent Office

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2017/057545

Citation	Pub.Date	Family	Pub.Date
US 20160162852 A1	09-06-2016	US 9361607 B1	07-06-2016
		US 9299109 B2	29-03-2016
		WO 2016178194 A1	10-11-2016