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(54) SYSTEM AND METHOD FOR ACTIVE TRAFFIC MONITORING

(57) An active traffic monitoring system (1) comprising a proximity sensor (2) adapted to sense a front proximity data (3) related to proximity of a front vehicle in front of a reference vehicle, to sense a back-proximity data (4) related to proximity of a back vehicle towards back of the reference vehicle, and a processing unit (5) adapted to receive and process the front proximity data (3) and the back-proximity data (4), to determine a front distance (6) between the refence vehicle and the front vehicle, and a back distance (7) between the reference vehicle and the back vehicle, processing the front distance (6) and the back distance (7), and based on processing, to determine if the reference vehicle is a problematic vehicle (8) creating congestion of the traffic.

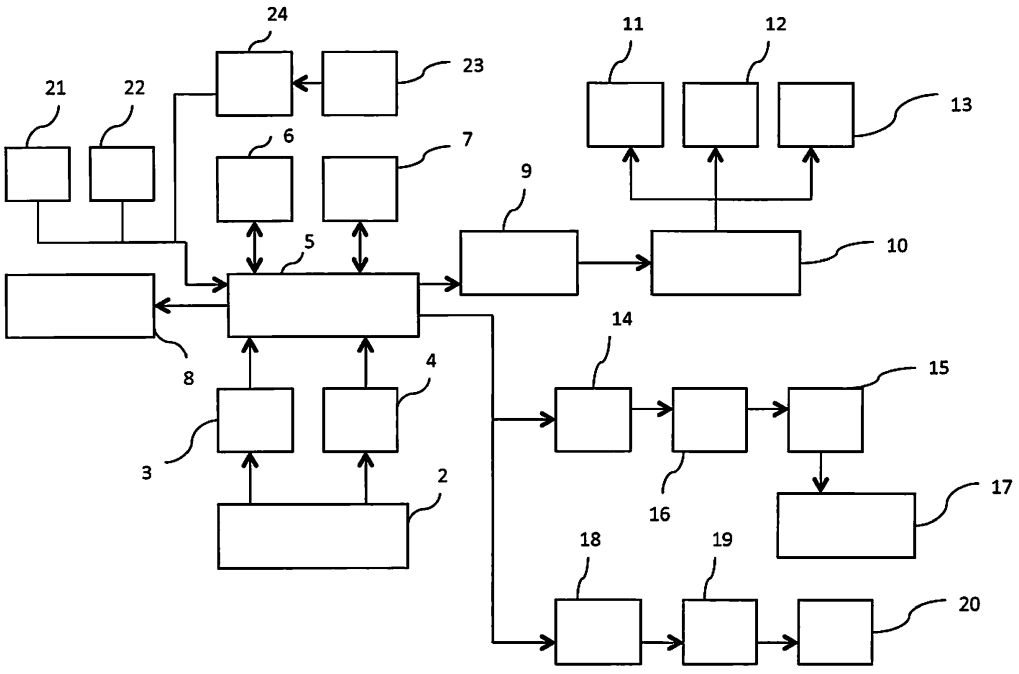

Fig 1

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Description

[0001] This invention refers to a system for active traffic monitoring according to claim 1, and a method for active traffic monitoring according to claim 10.

Background of the Invention

[0002] Sometimes vehicles are piled up in traffic, the speed of travel drops considerably and the waiting time increases. It is often understood that the reason for this is that one or more vehicles are travelling in the wrong lane or one or more of the vehicles travelling at unnecessary low speeds.

[0003] US Patent Publication No. US5317311 discloses a traffic congestion monitoring system which comprises infra-red monitoring units bolted to the sides of bridges over a motorway network and emitting information as to traffic congestion at their locations, a control center which receives and transmits the information, and paging units in respective vehicles and receiving the information and visually displaying the same upon diagrams of the network or zones thereof.

[0004] US Patent Publication No. US6411328 discloses apparatus and methods effective for detecting, locating and characterizing traffic-related incidents are based upon improved image processing techniques applied to infrared and visible light spectrum roadway images in a time sequence. Substantially real-time isolation and identification of anomalous or unexpected traffic conditions allows control of traffic signals and dispatch of law enforcement, maintenance or emergency medical care resources to reduce cost and increase safety. Detectable traffic-related incidents include, for example, the appearance of a stationary object on a roadway, the appearance of a pedestrian on a roadway, and the identification and location of vehicles obstructing traffic flow by moving too slowly or erratically or in the wrong direction. Programmable digital computer image processing allows automatic classification of the severity of detected incidents based on the potential for further traffic hazards and injuries, and can support automatic signals to alter traffic flow patterns for reducing the likelihood of incidents, as well as automatic alerts to law enforcement, maintenance and emergency medical personnel.

[0005] US Patent Publication No. US20100082180 discloses a method, system, and device for providing countermeasures against errant vehicles. A countermeasure controller determines a vehicle-velocity vector based on data from one or more sensors and compares the vehicle-velocity vector to an authorized-velocity vector. The vehicle is determined to be an errant vehicle if the vehicle-velocity vector is not aligned with the authorized-velocity vector. Then, the countermeasure controller may apply countermeasures to the errant vehicle. The countermeasures include electronic countermeasures, informational countermeasures, and physical countermeasures. The countermeasure controller can provide information to other drivers about the errant vehicle via personalized communication or electronic warning signs. The countermeasure controller can be configured to detect entry of vehicles into security areas based on data from one or more sensors. The countermeasure controller may then apply countermeasures to vehicles attempting unauthorized entry into a security area.

[0006] WIPO Patent Publication No. WO2012013228 discloses a method which comprises detecting a plurality of mobile devices at different geographical positions by means of receiving, by several sensor devices disposed at several known locations along a roadway, identifying information related to said mobile devices contained in wireless signals, determining which of said mobile devices detected at least at two sensor devices are associated to vehicles, by processing the received identifying information to find out the type of mobile device it relates to, establishing an exclusion velocity limit dynamically according to the velocities of the mobile devices associated to vehicles, and identifying slow-moving mobile devices with a velocity below said exclusion velocity limit, and monitoring traffic of the mobile devices which are not said slow-moving mobile devices.

[0007] Japanese Patent Publication No. JPH08106594 discloses a traffic jam judging device to judge the traffic jam on the basis of the information collected from a vehicle sensing means installed in each section. The traffic jam judging device includes a sectional degree-of-jam judging means which judges a traffic state in each section from the information, a correcting means which corrects the traffic state of that section judged by the sectional degree-of-jam judging means with reference to the traffic state in the section neighboring that section or the traffic state of that section in the past when the sectional traffic volume and the sectional speed of some section are included in a setting range, and a jam information generating means which generates the information about the whole jammed sections on the basis of the traffic state of each section after correction are provided. The correcting means can correct such an error that a non-jammed state is judged to be the jammed state because of the passing of a very slow vehicle or the error in the case that a standstill state due to the jam is judged to be the non-jammed state or the omission of measurement, and it can exhibit correctly the jammed section.

[0008] Chinese Patent Publication No. CN104680819 discloses a congestion-preventing method for roads. The congestion-preventing method for roads comprises the following steps: establishing connection; pre-setting a first collecting region scope, a second collecting region scope, a vehicle speed collecting time segment value, a vehicle number, a first boundary value for unblocked vehicle speed and slow vehicle speed and a second boundary value for slow vehicle speed and congested vehicle speed by a platform; detecting and judging information of vehicle speeds and vehicle positions, uploading the information of vehicle speeds and vehicle positions to

the platform; detecting and analyzing a first vehicle terminal numerical value passing through the first collecting region and a second vehicle terminal numerical value passing through the second collecting region within the vehicle speed collecting time segment by the platform, generating instructions according to the analysis result, judging the congestion conditions of roads, transmitting the instructions and the judgment result to a traffic light end and a vehicle terminal; displaying the congestion conditions of roads by the terminal; adjusting a running direction according to the instructions by the traffic light end. The congestion-preventing method and system for roads have the functions of intelligently recognizing the congestion conditions of roads and intelligently adjusting the running directions of traffic lights. In addition, the disclosure further provides a congestion-preventing system for roads.

[0009] However, most of other currently available systems are checking the speed of the vehicles and generally punishment is applied, if the speed of a vehicle is high.

[0010] In particular, none of the available systems and prior art documents provides an adaptive speed control method according to the speed of traffic.

Object of the Invention

[0011] It is therefore the object of the present invention is to provide for a technique for active traffic monitoring and controlling according to speed of traffic.

Description of the Invention

[0012] The before mentioned object is solved by a system for active traffic monitoring according to claim 1.

[0013] An active traffic monitoring system comprises a proximity sensor adapted to sense a front proximity data related to proximity of a front vehicle in front of a reference vehicle, to sense a back-proximity data related to proximity of a back vehicle towards back of the reference vehicle, and a processing unit adapted to receive and process the front proximity data and the back-proximity data, to determine a front distance between the refence vehicle and the front vehicle, and a back distance between the reference vehicle and the back vehicle, processing the front distance and the back distance, and based on processing, to determine if the reference vehicle is a problematic vehicle creating congestion of the traffic.

[0014] This provides for a mechanism for identifying a vehicle which is not moving according to speed of the traffic, and identifying it as a problematic vehicle. It's an optimal way of identifying vehicle which are creating problem for traffic movement by not matching to the speed of the traffic. In furtherance, such identification of problematic vehicle mechanism, can help authorities to warn or penalize such problematic vehicle, so that the problematic vehicle can rectify it's speed to match with the speed of traffic. It provides for active traffic control methodology. Such warning, and penalizing can be done manually also.

[0015] Further preferred embodiments are subject-matter of dependent claims and/or of the following specification parts.

[0016] According to a preferred embodiment of the system, the proximity sensor is a graphics sensor, such that the graphics sensor is adapted to capture a front graphics related to the front vehicle in front of the refence vehicle, and a back graphics related to the back vehicle at the back of the reference vehicle, and the processing unit is adapted to receive and process the front graphics data and the back graphics data, to determine a front distance between the refence vehicle and the front vehicle, and a back distance between the reference vehicle and the back vehicle, and based on the determination of the front distance and the back distance, to further determine if the vehicle is the problematic vehicle creating congestion of the traffic.

[0017] This embodiment is beneficial as it provides for another mechanism for identifying distance between vehicle by capturing images or videos as graphics data, and further processing the data using image processing technologies.

[0018] According to a further embodiment of the system, the processing unit is adapted to generate an alarm trigger on determination of the problematic vehicle, the system comprising an alarm placed in a location to be noticeable with respect to the problematic vehicle, and adapted to receive the alarm trigger, and to raise an audio signal, or an image signal, or a video signal, or combination thereof.

[0019] This embodiment is helpful, as it provides for an automated mechanism to warn driver of the vehicle, so that he can rectify it's speed, so that the speed of the traffic can be controlled actively.

[0020] According to another embodiment of the system, wherein on determination of the problematic vehicle, the processing unit is adapted to generate an information capturing trigger for capturing an information of the problematic vehicle, the system further comprising a vehicle information capturing module adapted to receive the information capturing trigger, to activate itself, to capture the information of the problematic vehicle, and a display unit placed in a location to be noticeable with respect to the vehicle, and adapted to receive the information of the problematic vehicle, and display the information of the problematic vehicle.

[0021] This embodiment is beneficial as it provides for another way to warn the driver of the vehicles. Here the display unit can be an in-veichle system, or shall be part of the road. The system provides for flashing the problematic vehicle on display unit of all the in-vehicle system, or the problematic vehicle's in-vehicle system, or the display unit which is part of the road.

[0022] According to a further preferred embodiment of the system, the display unit is placed along a road on which the problematic vehicle is to be travelled, and

adapted to display the information of the problematic vehicle, when the problematic vehicle is approaching the display.

[0023] This embodiment is helpful, as it provides for a mechanism to flash out the information of the problematic vehicle on road itself, so that the warning can be noticed without keeping eyes of the road.

[0024] According to a further embodiment of the system, at least one of the proximity sensor, the alarm, or the display unit is placed onto the vehicle.

[0025] This embodiment is beneficial, as it provides for easy implementation of the system, as having the sensors, the alarm or the display provides for self-monitoring and warning mechanism.

[0026] According to another embodiment of the system, the proximity sensor is adapted to sense the front proximity data and the back-proximity data at predefined intervals, and the processing unit processes the front proximity data and the back-proximity data to determine if the reference vehicle is the problematic vehicle after the predefined interval subsequently too, the processing unit is adapted to raise a penalty signal, the system comprising a penalty raising module adapted to receive the penalty signal, and the information of the problematic vehicle, and to generate a penalty against the problematic vehicle.

[0027] This embodiment is beneficial, as it provides for an automatic penalizing mechanism which provides for active control of traffic speed with no or minimal involving of manual efforts. Penalizing generally act as deterrent for vehicle driver for not creating the same offence of creating traffic nuisance again.

[0028] According to a further preferred embodiment of the system, the processing unit is adapted to compare the front distance to a first threshold value and the back distance to a second threshold value, and if the front distance is more than the first threshold value and the back distance is less than the second threshold value, the processing unit is adapted to determine the reference vehicle as the problematic vehicle.

[0029] The embodiment is beneficial, as it provides an efficient mechanism for determining a particular mechanism as problematic, thus providing an efficient monitoring of the traffic.

[0030] According to a further embodiment of the system, the system comprises a speed measurement module adapted to measure a speed of the reference vehicle, wherein the processing unit is adapted to receive the speed of the reference vehicle, and adapted to process the speed along with the front distance and back distance, and to determine if the reference vehicle is a problematic vehicle creating congestion of the traffic.

[0031] The embodiment is beneficial, as it further enhances efficiency of determining a particular mechanism as problematic, thus providing an efficient monitoring of the traffic.

[0032] The before mentioned object is also solved by method for active traffic monitoring, according to claim 10.

[0033] The method comprises steps of:

- sensing a front proximity data related to proximity of a front vehicle in front of a reference vehicle by a proximity sensor;
- sensing a back-proximity data related to proximity of a back vehicle towards back of the reference vehicle by the proximity sensor;
- determining a front distance between the reference vehicle and the front vehicle in front of the reference vehicle by a processing unit;
- determining a back distance between the reference vehicle and the back vehicle towards back of the reference vehicle by the processing unit;
- processing the front distance and the back distance; and
- based on the processing, determining if the reference vehicle is a problematic vehicle creating congestion of the traffic.

[0034] According to a further preferred embodiment of the method, the method comprises steps of:

- generating an alarm trigger by the processing unit on determination of the problematic vehicle; and
- receiving the alarm trigger by an alarm, and raising an audio signal, or an image signal, or a video signal, or combination thereof.

[0035] According to a further embodiment of the method, the method comprises steps of:

- based on determination of the problematic vehicle, generating an information capturing trigger by the processing unit for capturing an information of the problematic vehicle;
- receiving the information capturing trigger by a vehicle information capturing module, activating itself and capturing the information of the problematic vehicle;
- receiving and displaying of the information of the problematic vehicle by a display unit.

[0036] According to another embodiment of the method, the method comprises steps of:

- sensing the front proximity data and the back-proximity data at predefined intervals by the proximity sensor;

- processing the front proximity data and the back-proximity data by the processing unit, determining if the reference vehicle is the problematic vehicle after the predefined interval subsequently too, and based on the determination, raising a penalty signal;

- receiving the penalty signal and the information of the problematic vehicle by a penalty raising module, and generating a penalty against the problematic vehicle.

[0037] According to a further preferred embodiment of the method, the method comprises steps of:

- comparing the front distance to a first threshold value and the back distance to a second threshold value by the processing unit;

- and if the front distance is more than the first threshold value and the back distance is less than the second threshold value, determining the reference vehicle as the problematic vehicle by the processing unit.

[0038] According to a further embodiment of the method, the method comprises steps of:

- measuring speed of the reference vehicle by a speed measurement module;

- receiving the speed of the reference vehicle by the processing unit;

- processing the speed along with the front distance and back distance by the processing unit and determining if the reference vehicle is a problematic vehicle creating congestion of the traffic.

[0039] Further benefits, goals and features of the present invention will be described by the following specification of the attached figures, in which components of the invention are exemplarily illustrated. Components of the devices and method according to the inventions, which match at least essentially with respect to their function, can be marked with the same reference sign, wherein such components do not have to be marked or described in all figures.

[0040] The invention is just exemplarily described with respect to the attached figure in the following.

Brief Description of the Drawings

[0041]

Fig. 1 illustrates a schematic diagram of an active traffic monitoring system, according to an embodiment of the invention.

Fig. 2 illustrates a method flow chart for active traffic monitoring system, according to an embodiment of the invention.

Detailed Description of the Drawings

[0042] The present invention focuses on active traffic monitoring to identify it there is a congestion, and if the congestion is due to a specific vehicle. The traffic nuisance, not only happens due to the rash driving, but also due to unexpected slow driving, where the speed is much lower in comparison to other vehicles, and making the other vehicle to drive slow, and further increasing the commutation time of the vehicle. And, if the speed is too slow, it may result into the congestion also. For an optimal traffic movement, the vehicle which is driving at very low speed in comparison to other vehicles, is required to be corrected for an optimal control on the traffic situation. The invention helps to provide a solution for handling such a traffic situation.

[0043] Fig 1 illustrates a schematic diagram of an active traffic monitoring system 1. The system includes one or more proximity sensors 2 which are enabled to capture proximity data 3, 4. The proximity sensor 2 can be placed onto a reference vehicle or on the road on which the reference vehicle is travelling. The front proximity data 3 relates to proximity of one or more front vehicles in front of a reference vehicle. The back-proximity data 4 relates to proximity of one or more back vehicles towards back of the reference vehicle.

[0044] The system 1 also includes a processing unit 5 which receives the proximity data 3, 4, and processes the proximity data 3, 4, and determines a front distance 6 between the refence vehicle and one or more of the front vehicles, and a back distance 7 between the reference vehicle and one or more of the back vehicles. The processing unit 5 processes the front distance 6 and the back distance 7, and determines if the reference vehicle is a problematic vehicle 8 which is creating congestion of the traffic.

[0045] In one embodiment, the proximity sensor 2 is a graphics sensor 2. The graphics sensor 2 captures a front graphics 3 related to the front vehicle in front of the refence vehicle, and a back graphics 4 related to the back vehicle at the back of the reference vehicle. The processing unit 5 receives and processes the front proximity data 3 and the back-proximity data 4, and determines a front distance 6 between the refence vehicle and the front vehicle, and a back distance 7 between the reference vehicle and the back vehicle. The processing unit 5 further processes the front distance 6 and the back distance 7, determines if the reference vehicle is a problematic vehicle 8 creating congestion of the traffic. The graphics data can be any pictorial representation like image, video, etc.

[0046] The proximity sensors 2 can also be electromagnetic, photoelectric, infrared, RFID, capacitive based sensors, or any such type of sensors which can help the

system in determining the distance between the reference vehicle, and other vehicles travelling on the road, and at least the distance between the reference vehicle, and immediate preceding and succeeding vehicles.

[0047] Once the system 1 is known with the problematic vehicle 8, the system 1 can move ahead from monitoring mode to control mode or corrective mode, by warning the problematic vehicle 8. For the same, the system 1 also includes an alarm 10 which is placed in a location to be noticeable with respect to the problematic vehicle 8. The system 1 is enabled to warn a driver of the problematic vehicle 8 by using the alarm 10. On identification of the problematic vehicle 8, the processing unit 5 generates an alarm trigger 9, and further send the alarm trigger 9 to the alarm 10. The alarm 10 receives the alarm trigger 9, and raises an audio signal 11, or an image signal 12, or a video signal 13, or combination thereof.

[0048] In another embodiment, for warning the driver of the problematic vehicle 8, the system includes a vehicle information capturing module 16, and a display unit 17. On determination of the problematic vehicle 8, the processing unit 5 generates an information capturing trigger 14 for capturing an information 15 of the problematic vehicle 8 and send the information capturing trigger 14 to the vehicle information capturing module 16. The vehicle information capturing module 16 receives the information capturing trigger 14, activates itself and captures the information 15 of the problematic vehicle 8. The information 15 can be captured by the vehicle information capturing module 16 by clicking a photograph of the vehicle 16 and further applying image processing to identify characteristics of the vehicle like color, model, vehicle registration number, or by retrieving information 15 about the problematic vehicle 8 from a database, or by reading any unique identification provided on the problematic vehicle 8 and processing the unique identification to retrieve information 15 of the problematic vehicle 8. Further, the display unit 17, which is placed in a location to be noticeable with respect to the vehicle, receives the information 15 of the problematic vehicle 8, and displays the information 15 of the problematic vehicle 8.

[0049] In one embodiment, the display unit 17 is placed along a road on which the problematic vehicle 8 is to be travelled, and displays the information 15 of the problematic vehicle 8, when the problematic vehicle 8 is approaching the display unit 17.

[0050] In another embodiment, the display unit 17 can also be placed inside the vehicle, so that it can be easily noticeable by the driver of the problematic vehicle 8 for which the warning is to be displayed. In case of in-vehicle placement of the display unit 17, the system 1 may only display the information 15 of the problematic vehicle 8, only onto the display unit 17 only onto the problematic vehicle 8.

[0051] The alarm 8, and the combination of the vehicle information capturing module 16 and the display unit 17, can be used in alternation or combination to warn the driver of the problematic vehicle 8.

[0052] In one embodiment, the alarm 10 or the proximity sensor 2, or both, can be placed onto the vehicle itself. It helps in self-monitoring and warning of the vehicles.

[0053] For determining, if the reference vehicle is the problematic vehicle 8, the processing unit 5 compares the front distance 6 to a first threshold value 21 and the back distance 7 to a second threshold value 22, and if the front distance 6 is more than the first threshold value 21 and the back distance 7 is less than the second threshold value 22, the processing unit 5 is adapted to determine the reference vehicle as the problematic vehicle 8.

[0054] It is to be noted that in one embodiment, the system 1 need not compare the distances 6, 7 with thresholds 21, 22, and simply process the distances 6, 7 alone to determine the problematic vehicle 8. One of only considering the processing of the distances 6, 7 is to correlate the distances 6, 7 with respect to each other.

[0055] The system 1 also includes a speed measurement module 23 which measures a speed 24 of the reference vehicle. The processing unit 5 receives the speed 24 of the reference vehicle, and processes the speed 24 along with the front distance 6 and the back distance. Based on the processing, the processing unit 5 determines if the reference vehicle is a problematic vehicle 8 creating congestion of the traffic. It is to be noted that use of speed 24 of the reference vehicle helps to reduce the false positive with respect to determination of the problematic vehicle 8. In cases, if the vehicle is moving on an optimal speed, then there may be a chance that because of improper speeds of the other vehicles which are in proximity of the reference vehicle, a situation has aroused that the distances 6, 7 with respect to the front vehicles and back vehicles has been automatically moves into a pattern which has made it to appear the reference vehicle as problematic vehicle 8. However, it should be noted that the system 1 can also determine the problematic vehicle 8 without consideration of the speed 24 of the reference vehicle.

[0056] For providing a deterrence, warning may not be enough, and the problematic vehicle 8 may be required to penalize. To incorporate this level of control, the system 1 is provided with a penalty raising module 19. To effectuate the penalizing procedure, the proximity sensor 2 senses the front proximity data 3 and the back-proximity data 4 at predefined intervals. In furtherance, the processing unit 5 processes the front proximity data 3 and the back-proximity data 4 to determine if the reference vehicle is the problematic vehicle 8 after the predefined interval subsequently too, and in such scenario the processing unit 5 raises a penalty signal 18. The penalty signal 18 is further received by the penalty raising module 19. The penalty raising module 19 also receives the information 15 of the problematic vehicle 8 and generates a penalty 20 against the problematic vehicle 8. In an alternate embodiment, the deterrence is not kept as the control mechanism for the traffic, and hence the penalty raising module 19 is not incorporated, and penalizing

mechanism is avoided.

[0057] Fig 2 discloses a method flow chart for active traffic monitoring system, according to an embodiment of the invention. In step 101, the proximity data are sensed by the proximity sensor, and further, the processing unit receives and processes the proximity data to determine the front distance between the reference vehicle and the front vehicle in front of the reference vehicle, and the back distance between the reference vehicle and the back vehicle towards back of the reference vehicle. In step 102, the processing unit determines if the front distance is longer than a first threshold and if the front distance is not longer than the first threshold, the processing shall move to step 101, otherwise it shall move to step 103. In step 103, the processing unit shall determine if the back distance is longer than a second threshold, and if the back distance is longer than the second threshold, the processing shall move to step 101, otherwise it shall move to step 104. In step 104, the processing unit shall check if the speed of the reference vehicle is lower than a third threshold, and if the speed is not lower than the third threshold, the processing shall move to the step 101, otherwise it shall move to the step 105. In step 105, a counter shall check if the provided warning is less than a fourth threshold or more than the fourth threshold, and if the warning is less than the fourth threshold, processing shall move to the step 108, otherwise the processing shall move to the step 106 by raising a penalty signal. In step 106, a penalty raising unit receives the penalty signal, and receives the information about the problematic vehicle, and raises the penalty, and move to processing for the step 107. In step 107, the counter is reset to capture the number of warnings freshly. In step 108, the processing unit raises alarm trigger, or raises information capturing trigger, and thereafter the alarm trigger is received by the alarm, and the alarm is raised as the warning to the driver of the problematic vehicle, or the information capturing trigger is received by the information capture modules which further captures the information of the problematic vehicle, and send it to a display unit, and the display unit displays the information as the warning to the driver of the problematic vehicle. In step 109, the processing unit shall wait for the driver of the problematic vehicle to respond by rectifying the movement of the problematic vehicle, thereafter the processing unit shall begin the processing again from step 101. It is to be noted that the mentioned method flow is one of the implementation of the invention, and the invention can also be implemented by varying the steps, like by interchanging the steps 102, 103, 104, or even by avoiding step 104 as part of implementation, or there may be such other variations in the method flow for implementing the aspects of the invention.

[0058] The invention has application for all types of vehicle travelling on the road, and for any types of geographies, and roads following different traffic regulations, and different level of quantum of traffic.

[0059] Thus, the present invention provides for an active traffic monitoring system 1 which includes a proximity sensor 2 which senses a front proximity data 3 related to proximity of a front vehicle in front of a reference vehicle, and senses a back-proximity data 4 related to proximity of a back vehicle towards back of the reference vehicle, and a processing unit 5 which receives and processes the front proximity data 3 and the back-proximity data 4, determines a front distance 6 between the refence vehicle and the front vehicle, and a back distance 7 between the reference vehicle and the back vehicle, processing the front distance 6 and the back distance 7, and based on processing, determines if the reference vehicle is a problematic vehicle 8 creating congestion of the traffic.

List of reference numbers

[0060]

1	system
2	proximity sensor
3	front proximity data
4	back-proximity data
5	processing unit
6	front distance
7	back distance
8	problematic vehicle
9	alarm trigger
10	alarm
11	audio signal
12	image signal
13	video signal
14	image capturing trigger
15	information of the problematic vehicle
16	vehicle image capturing module
17	display unit
18	penalty signal
19	penalty raising module
20	penalty
21	first threshold value
22	second threshold value
23	speed measurement module
24	speed
101	Step for determining front distance and back distance
102	Step for comparing the front distance with the first threshold
103	Step for comparing the back distance with the second threshold
104	Step for calculating speed of the reference vehicle and comparing it with a third threshold
105	Step for checking number of warning
106	Step for applying punishment
107	Step for resetting the warnings
108	Step for warning the driver
109	Step for recording number of warning
110	Step for waiting for driver's response

Claims

1. An active traffic monitoring system (1) comprising:

   - a proximity sensor (2) adapted to sense a front proximity data (3) related to proximity of a front vehicle in front of a reference vehicle, to sense a back-proximity data (4) related to proximity of a back vehicle towards back of the reference vehicle; and
   - a processing unit (5) adapted to receive and process the front proximity data (3) and the back-proximity data (4), to determine a front distance (6) between the refence vehicle and the front vehicle, and a back distance (7) between the reference vehicle and the back vehicle, processing the front distance (6) and the back distance (7), and based on processing, to determine if the reference vehicle is a problematic vehicle (8) creating congestion of the traffic.

2. The system (1) according to the claim 1, wherein the proximity sensor (2) is a graphics sensor (2), such that

   - the graphics sensor (2) is adapted to capture a front graphics (3) related to the front vehicle in front of the refence vehicle, and a back graphics (4) related to the back vehicle at the back of the reference vehicle; and
   - the processing unit (5) is adapted to receive and process the front graphics data (3) and the back graphics data (4), to determine the front distance (6) between the refence vehicle and the front vehicle, and the back distance (7) between the reference vehicle and the back vehicle, and based on the determination of the front distance (6) and the back distance (7), to further determine if the reference vehicle is the problematic vehicle (8) which creates a congestion of the traffic.

3. The system (1) according to any of the claims 1 or 2, wherein the processing unit (5) is adapted to generate an alarm trigger (9) on determination of the problematic vehicle (8), the system comprising:

   - an alarm (10) placed in a location to be noticeable with respect to the problematic vehicle (8), and adapted to receive the alarm trigger (9), and to raise an audio signal (11), or an image signal (12), or a video signal (13), or a combination thereof.

4. The system (1) according to any of the claims 1 or 2, wherein on determination of the problematic vehicle (8), the processing unit (5) is adapted to generate an information capturing trigger (14) for capturing an information (15) of the problematic vehicle (8), the system (1) further comprising:

   - a vehicle information capturing module (16) adapted to receive the information capturing trigger (14), to activate itself, to capture the information (15) of the problematic vehicle; and
   - a display unit (17) placed in a location to be noticeable with respect to the vehicle, and adapted to receive the information (15) of the problematic vehicle (8), and display the information (15) of the problematic vehicle (8).

5. The system (1) according to the claim 4, wherein the display unit (17) is placed along a road on which the problematic vehicle (8) is to be travelled, and adapted to display the information (15) of the problematic vehicle (8), when the problematic vehicle (8) is approaching the display unit (17).

6. The system (1) according to any of the claims 1 to 5, wherein at least one of the proximity sensor (2), the alarm (10), or the display (17) is placed onto or within the vehicle.

7. The system (1) according to any of the claims 1 to 6, wherein the proximity sensor (2) is adapted to sense the front proximity data (3) and the back-proximity data (4) at predefined intervals, and the processing unit (5) processes the front proximity data (3) and the back-proximity data (4) to determine if the reference vehicle is the problematic vehicle (8) after the predefined interval subsequently, the processing unit (5) is adapted to raise a penalty signal (18), the system (1) comprising:

   - a penalty raising module (19) adapted to receive the penalty signal (18), and the information (15) of the problematic vehicle (8), and to generate a penalty (20) against the problematic vehicle (8).

8. The system (1) according to any of the claims 1 to 7, wherein the processing unit (5) is adapted to compare the front distance (6) to a first threshold value (21) and the back distance (7) to a second threshold value (22), and if the front distance (6) is more than the first threshold value (21) and the back distance (7) is less than the second threshold value (22), the processing unit (5) is adapted to determine the reference vehicle as the problematic vehicle (8).

9. The system (1) according to any of the claims 1 to 8 comprising:

   - a speed measurement module (23) adapted to measure a speed (24) of the reference vehicle,

wherein the processing unit (5) is adapted to receive the speed (24) of the reference vehicle and is adapted to process the speed (24) along with the front distance (6) and the back distance (7), and to determine if the reference vehicle is a problematic vehicle (8) creating congestion of the traffic.

10. A method for active traffic monitoring comprising:

- sensing a front proximity data (3) related to proximity of a front vehicle in front of a reference vehicle by a proximity sensor (2);
- sensing a back-proximity data (4) related to proximity of a back vehicle towards back of the reference vehicle by the proximity sensor (2);
- determining a front distance (6) between the reference vehicle and the front vehicle in front of the reference vehicle by a processing unit (5);
- determining a back distance (7) between the reference vehicle and the back vehicle towards back of the reference vehicle by the processing unit (5);
- processing the front distance (6) and the back distance (7); and
- based on the processing, determining if the reference vehicle is a problematic vehicle (8) creating congestion of the traffic.

11. The method according to the claim 10 comprising:

- generating an alarm trigger (9) by the processing unit (5) on determination of the problematic vehicle (8); and
- receiving the alarm trigger (9) by an alarm (10), and raising an audio signal (11), or an image signal (12), or a video signal (13), or combination thereof.

12. The method according to any of the claims 10 or 11 comprising:

- based on determination of the problematic vehicle (8), generating an information capturing trigger (14) by the processing unit (5) for capturing an information (15) of the problematic vehicle (8);
- receiving the information capturing trigger (14) by a vehicle information capturing module (16), activating itself and capturing the information (15) of the problematic vehicle (8);
- receiving and displaying of the information (15) of the problematic vehicle (8) by a display unit (17).

13. The method according to any of the claims 10 to 12 comprising:

- sensing the front proximity data (3) and the back-proximity data (4) at predefined intervals by the proximity sensor (2);
- processing the front proximity data (3) and the back-proximity data (4) by the processing unit (5), determining if the reference vehicle is the problematic vehicle (8) after the predefined interval subsequently too, and based on the determination, raising a penalty signal (18);
- receiving the penalty signal (18) and the information (15) of the problematic vehicle (8) by a penalty raising module (19), and generating a penalty (20) against the problematic vehicle (8).

14. The method according to any of the claims 10 to 13 comprising:

- comparing the front distance (6) to a first threshold value (21) and the back distance (7) to a second threshold value (22) by the processing unit (5);
- and if the front distance (6) is more than the first threshold value (21) and the back distance (7) is less than the second threshold value (22), determining the reference vehicle as the problematic vehicle (8) by the processing unit (5).

15. The method according to any of the claims 10 to 14 comprising:

- measuring speed (24) of the reference vehicle by a speed measurement module (23);
- receiving the speed (24) of the reference vehicle by the processing unit (5);
- processing the speed (24) along with the front distance (6) and back distance (7) by the processing unit (5) and determining if the reference vehicle is a problematic vehicle (8) creating congestion of the traffic.

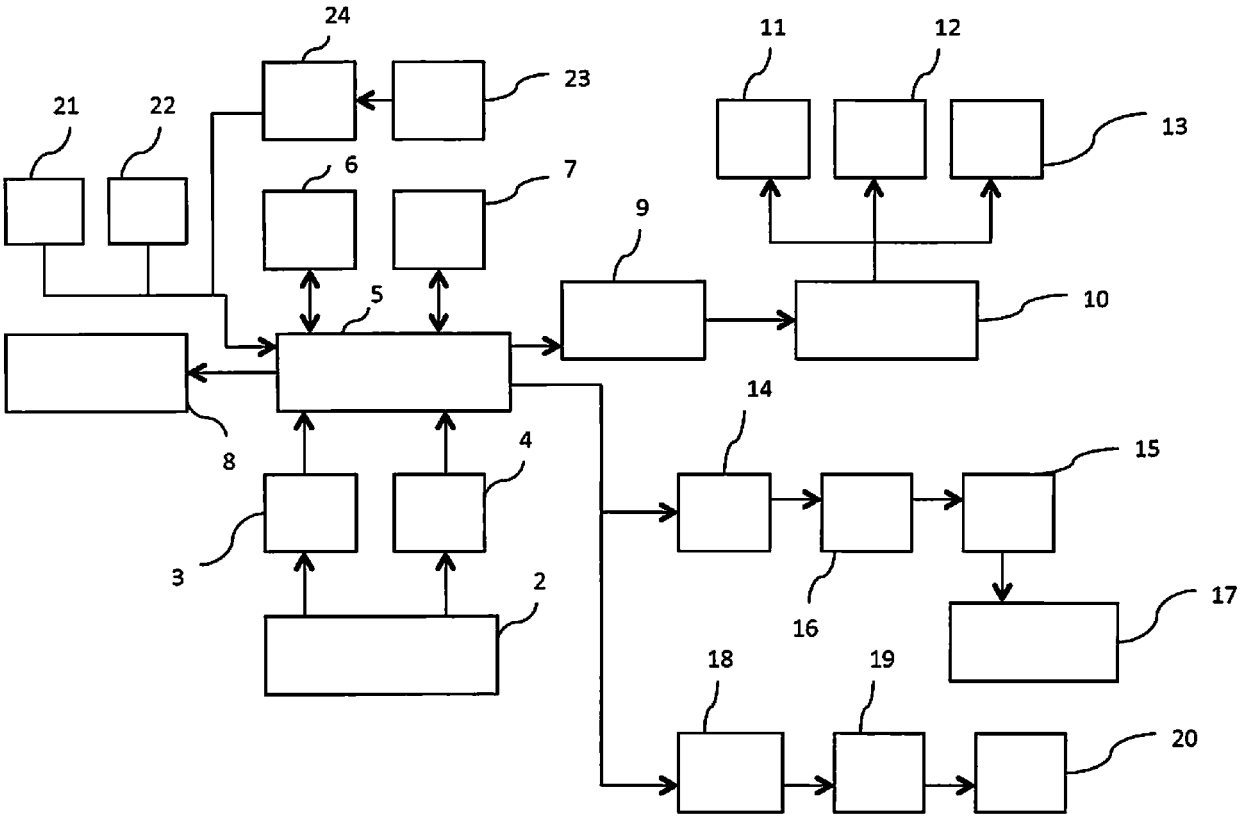

Fig 1

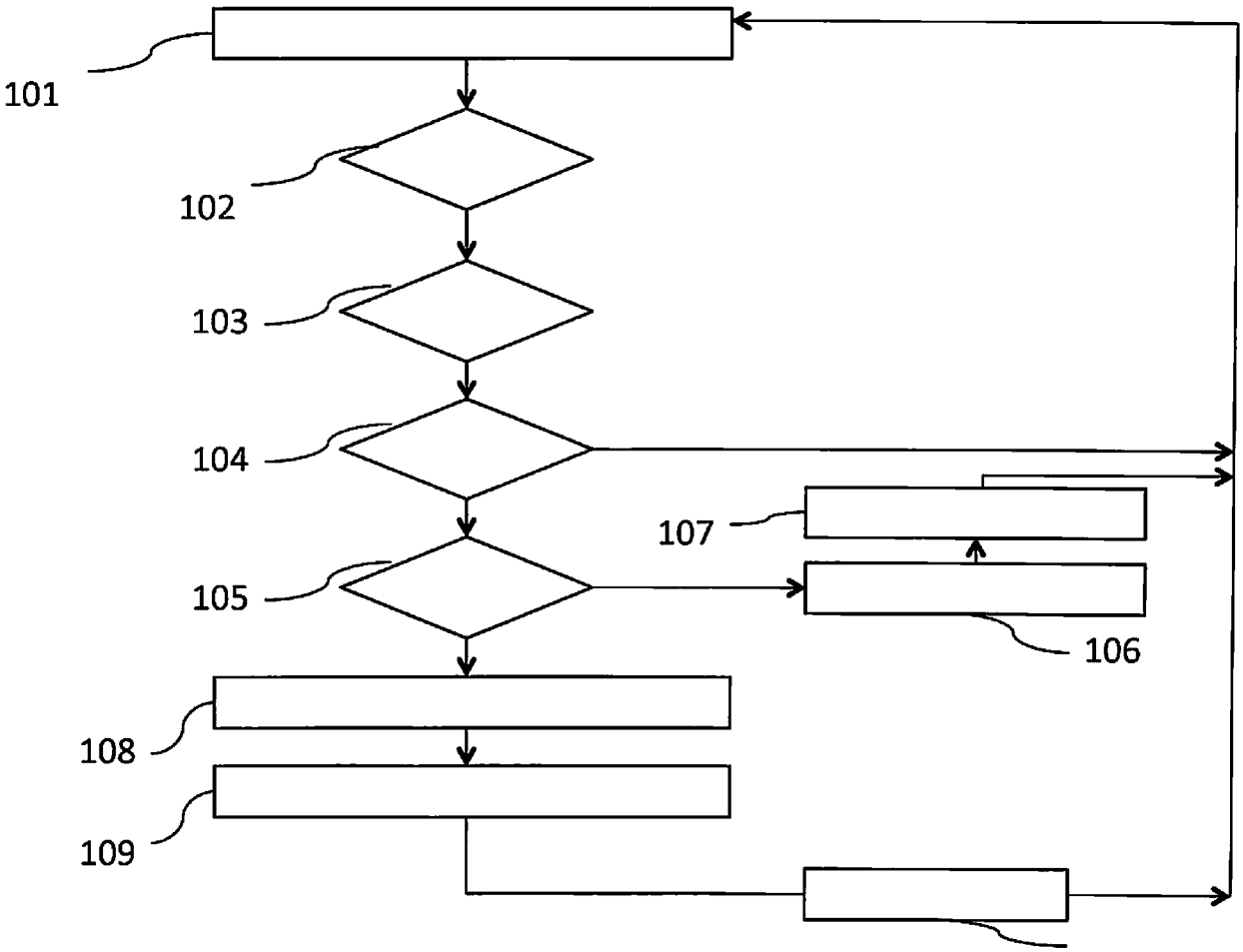

Fig 2

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 7388

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 2017/294117 A1 (BURKE BERTRAM V [US] ET AL) 12 October 2017 (2017-10-12) * paragraphs [0001], [0030], [0062], [0084], [0085], [0092] - [0095], [0147], [0147], [0150], [0153], [0157], [0176], [0177] * -----	1,2,6,8, 10,11,14 3-5,7,9, 12,13,15	INV. G08G1/01 G08G1/017 G08G1/04 G08G1/052 G08G1/095
Y	KR 101 060 460 B1 (CHO YONG SUNG [KR]) 29 August 2011 (2011-08-29) * paragraphs [0001], [0004], [0008], [0010] - [0014], [0019] - [0024], [0028] - [0033], [0035], [0046] * & KR 101 060 460 K2 (CHO YONG SUNG [KR]) 29 August 2011 (2011-08-29) * paragraphs [0001], [0004], [0008], [0010] - [0014], [0019] - [0024], [0028] - [0033], [0035], [0046] * -----	3-5,9, 12,15 3-5,9, 12,15	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 April 2018	Fagundes-Peters, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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17-04-2018

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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