FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

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THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

(See sections 10; rule 13)

TITLE OF THE INVENTION

SYSTEM AND METHOD FOR REAL-TIME TRAFFIC MANAGEMENT

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SYSTEM AND METHOD FOR REAL-TIME TRAFFIC MANAGEMENT

BACKGROUND

Technical Field

[0001] The embodiments herein generally relate to a traffic management system, and more particularly, to a system and method for traffic management in a real-time.

Description of the Related Art

[0002] In single lanes roads the vehicles travel in both directions and so vehicle congestion will be more in single lanes roads compared to any other roads. The vehicles moving in one direction in the first side are not aware of the exact position, speed and number of vehicles that are moving from the opposite direction with relatively high speed in the second side. Therefore, the vehicles which need to overtake slow moving vehicles take higher risks. Also, the vehicles do not have complete local traffic information when to increase or decrease speed based on curved nature or straight nature of the road. This might lead to accidents, and hence there arises a question on safety.

[0003] Considerable efforts have been made in recent years to ensure the safety of vehicles on roads. Existing approaches do not have traffic information gathering means to compute the number, speed and position of each vehicle in real-time. The Existing approaches use predetermined historical traffic information to guide the vehicles. The main drawback of using the existing approaches is that they are not de-centralized to provide assistance to each vehicle individually. This drawback further raises a question on safety. Also, the existing approaches do not compute the waiting time of each individual vehicle which is waiting to overtake. This might lead to more consumption of resources and more traffic congestion in a single direction. The existing approaches do not consider cooperative and yet competitive group of vehicles to schedule safe overtaking.

[0004] Accordingly, there remains a need for a system for traffic management in real-time.

SUMMARY

[0005] In view of the foregoing, an embodiment herein provides a system for traffic evaluation and management. The system includes a traffic management server including a

storage device and a processor in communication with the storage device. wherein the processor executes machine readable instructions to perform (i) receiving a media content from an area between a first point and a second point of a road, wherein the media content is captured using a plurality of devices; characterized in that, (ii) transforming the media content to machine readable media content; processing of the machine-readable media content wherein the processing including (a) generating a database of a plurality of vehicles present in the area between the first point and the second point of the road and tagging the plurality of vehicles as per their position; (b) computing a speed of each of the plurality of vehicles from a first position of the vehicle from the media content captured at a first instance and a second position of the vehicle from the media content captured at a second instance, (c) classifying the plurality of vehicles into a first set of vehicles and a second set of vehicles based on a range of speed, (d) predicting a position of each of the plurality of vehicles based on the speed ahead of time, (e) determining the gaps that exceed a threshold distance between the first set of the vehicles and the second set of vehicles, (f) computing a potential length of a gap between the first set of vehicles and the second set of vehicles; and (g) identifying a vehicle crossing the threshold distance of the gap ahead of time from the first set of vehicles and the second set of vehicles; (iii) generating recommendation comprising a speed suggestion to each of the plurality of vehicles ahead of time to maintain the gap between the first set of vehicles and the second set of vehicles; and (iv) providing recommendations for overtaking or continuing in a lane to be sent to each of the plurality of vehicles.

[0006] In an embodiment, the processor that executes machine readable instructions for performing: determining a vehicle that has followed recommendations and updating the database with vehicle information comprising a position and a speed of the vehicle.

[0007] In another embodiment, the system includes a control unit that (i) receives an input of information of the road, and a position of each vehicle on the road, when the road is straight or curved road and (ii) determines a number of vehicles on a length of the road; and (iii) captures and communicates relative positions of the plurality of vehicles to the traffic management server. The input is communicated by (a) a vehicle assistance module that is incorporated in a communication device of each of the plurality vehicle or (b) a plurality of moving drones that captures a vehicular traffic information from the road using at least one sensor or at least one camera.

[0008] In another embodiment, the system includes the processor that executes machine readable instructions for performing, generating a multi agent simulation to visualize the traffic information comprising the position of the plurality of vehicles ahead of time; and identifying gaps to overtake for a vehicle in real time.

[0009] In yet another embodiment, the system includes the processor that executes machine- readable instructions for performing (i) identifying a traffic congestion when the one or more vehicles move at a speed less than a predetermined threshold for more than a predetermined duration at a traffic information analysis module; (ii) identifying points and vehicles at the points at the traffic information analysis module; and (iii) generating commands at a command generation module to the vehicles to increase or decrease the speed or to overtake a vehicle that is running in front.

[0010] In yet another embodiment, the system when the road is single lane road, includes the processor that executes machine readable instructions to perform, (i) identifying a traffic congestion when the one or more vehicles on the first side of the road moving at speed less than a predetermined threshold for more than a predetermined duration, (ii) identifying points and vehicles at the points on a second side of the single lane road, (iii) generating commands at a command generation module to the vehicles at the points on the second side of the single lane road to increase or decrease the speed to generate gaps for vehicles on the first side of the single lane road to enable the second side vehicle to overtake at precomputed cross points, (iv) determining a duration for crossing the cross points by a plurality of vehicles on the first side of the single lane road and a plurality of vehicles on the second side of the single lane road; and (v) de-recognizing the cross points when the traffic congestion is cleared.

[0011] In yet another embodiment, the system includes a plurality of moving drones with traffic lights that capture vehicular traffic information from a road using at least one sensor or at least one camera. The plurality of moving drones capture data including, (a) a number of vehicles on the road; (b) a position of each of the vehicle; (c) a condition of the road with respect to the position of the vehicle, and communicates the data to a control unit and receives an instruction from the control unit to display traffic signal to an optimal speed and optimal height for visibility to the drivers of the vehicles.

[0012] In yet another embodiment, the control unit issues a speed recommendation to a vehicle on the first side of the road and after the recommendation is accepted, adds the vehicle to either the first set of vehicles or the second set of vehicles.

[0013] In yet another embodiment, the plurality of devices include a depth sensor or a depth determining radar or any other method to localize the vehicle and their speeds.

[0014] In yet another embodiment, each vehicle includes a device for generating commands or to a distress call along with a sensor to determine a position of the vehicle.

[0015] In one aspect, a method of traffic evaluation and management is provided. The method includes the steps of (i) receiving a media content from an area between a first point and a second point of a road, wherein the media content is captured using a plurality of devices, (ii) transforming the media content to machine readable media content, (iii) processing of the machine-readable media content, wherein said processing includes the steps of (a) generating a database of a plurality of vehicles present in the area between the first point and the second point of the road and tagging the plurality of vehicles as per their position, (b) computing a speed of each of the plurality of vehicles from a first position of the vehicle from the media content captured at a first instance and a second position of the vehicle from the media content captured at a second instance, (c) classifying the plurality of vehicles into a first set of vehicles and a second set of vehicles based on a range of speed, (d) predicting a position of each of the plurality of vehicles based on the speed ahead of time, determining the gaps that exceed a threshold distance between the first set of the vehicles and the second set of vehicles, (e) computing a potential length of a gap between the first set of vehicles and the second set of vehicles, and (f) identifying a vehicle crossing the threshold distance of the gap ahead of time from the first set of vehicles and the second set of vehicles, (iv) generating recommendation including a speed suggestion to each of the plurality of vehicles ahead of time to maintain the gap between the first set of vehicles and the second set of vehicles, and (v) providing recommendations for overtaking or continuing in a lane to be sent to each of the plurality of vehicles.

[0016] In one embodiment, the method includes the steps of (i) processing that includes the steps of, determining a vehicle that has followed a recommendation; and (ii) updating the database with the vehicle information including a position and a speed of the vehicle.

[0017] In another embodiment, the method includes the steps of (i) receiving a input of information of a road, a position of each vehicle on the road and information of the road at a control unit, wherein the road is a straight or curved road, the input is communicated by (a) a vehicle assistance module incorporated in a communication device in each of the plurality vehicle or (b) a plurality of moving drones that capture vehicular traffic information from a road using at least one sensor or at least one camera, (ii) determining a number of vehicles on a length of the road, and (iii) capturing and communicating relative positions of a plurality of vehicles to a traffic management evaluation server.

[0018] In an embodiment, the method includes the steps of generating a multi agent simulation to visualize the traffic information including the position of the plurality of vehicles ahead of time and identifying gaps to overtake for a vehicle in real time.

[0019] In an embodiment, the method includes the steps of (i) identifying a traffic congestion when a plurality of vehicles move at a speed less than a predetermined threshold for more than a predetermined duration at a traffic information analysis module, (ii) identifying points and vehicles at the points at the traffic information analysis module, and (iii) generating commands at a command generation module to the vehicles to increase or decrease the speed or to overtake a vehicle that is running in front.

[0020] In an embodiment, the method includes the steps of (i) identifying a traffic congestion when a plurality of vehicles on the first side of the road moving at speed less than a predetermined threshold for more than a predetermined duration, (ii) identifying points and vehicles at the points on a second side of the single lane road, (iii) generating commands at a command generation module to the vehicles at the points on the second side of the single lane road to increase or decrease the speed to generate gaps for vehicles on the first side of the single lane road to enable the second side vehicle to overtake at precomputed cross points, (iv) determining a duration for crossing the cross points by a plurality of vehicles on the first side of the single lane road and a plurality of vehicles on the second side of the single lane road, and (iv) de-recognizing the cross points when the traffic congestion is cleared.

[0021] In an embodiment, the method includes the steps of (i|) capturing, by a plurality of moving drones with traffic lights, vehicular traffic information from a road using at least one sensor or at least one camera wherein the plurality of moving drones capture data including (a) a number of vehicles on the road; (b) a position of each of the vehicle (c) a condition of the

road with respect to the position of the vehicle, and (ii) communicating the data to a control unit and receiving an instruction from the control unit to display traffic signal to an optimal speed and optimal height for visibility to the drivers of the vehicles.

[0022] In an embodiment, the method includes the steps of issuing by the control unit, a speed recommendation to a vehicle on the first side of the road and after the recommendation is accepted, adding the vehicle to either the first set of vehicles or the second set of vehicles.

[0023] In an embodiment, the method includes the step of localizing vehicles and their speeds by a depth sensor or a depth determining radar.

[0024] In an embodiment, each vehicle includes a device for generating commands or to a distress call along with a sensor to determine a position of the vehicle.

[0025] The major advantage of the system is that it allows individual management of a vehicle on the road by providing personalized recommendations. The system further enables grouping of vehicles based on their speed and manages these groups for efficient movement of traffic. This makes the system far more efficient in terms of reduced fuel consumption, travel time and thereby saving precious human hours and enhance productivity. Further, the system reduces time and resources for management of traffic by providing efficient predictions based on real time monitoring of the vehicles on the road. In cities with single lane roads and traffic congestion problems, the present system approach is affordable, efficient and easy to maintain.

[0026] These and other aspects of the embodiments herein will be better appreciated and understood when considered in conjunction with the following description and the accompanying drawings. It should be understood, however, that the following descriptions, while indicating preferred embodiments and numerous specific details thereof, are given by way of illustration and not of limitation. Many changes and modifications may be made within the scope of the embodiments herein without departing from the spirit thereof, and the embodiments herein include all such modifications.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The embodiments herein will be better understood from the following detailed description with reference to the drawings, in which:

[0028] FIG. 1A illustrates a system view of a system for obtaining traffic information in a single lane road and guiding vehicles in a real-time using one or more moving drones

according to an embodiment herein;

[0029] FIG. 1B illustrates a system view of a system for obtaining traffic information in a single lane road and guiding vehicles individually in the real-time using one or more vehicle assistance systems according to an embodiment herein;

[0030] FIG. 2 illustrates an exploded view of a moving drone of FIG.1A according to an embodiment herein;

[0031] FIG. 3 illustrates an exploded view of a vehicle assistance system of FIG.1B according to an embodiment herein;

[0032] FIG. 4 illustrates an exploded view of a traffic management server according to an embodiment herein;

[0033] FIG. 5 is a flow diagram illustrating a method for obtaining and communicating the traffic information and guiding vehicles in the real-time using one or more vehicle assistance systems of FIG. 1B according to an embodiment herein;

[0034] FIG. 6 is a flow diagram illustrating a method for obtaining and communicating the traffic information and guiding the vehicles in the real-time using the one or more moving drones of FIG. 1A according to an embodiment herein;

[0035] FIG. 7 is a flow diagram illustrating a method for receiving the traffic information and providing signals using the traffic management server of FIG. 1A according to an embodiment herein; and

[0036] FIG. 8 illustrates a schematic diagram of a generic computer architecture used in accordance with the embodiments herein.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0037] The embodiments herein and the various features and advantageous details thereof are explained more fully with reference to the non-limiting embodiments that are illustrated in the accompanying drawings and detailed in the following description. Descriptions of well-known components and processing techniques are omitted so as to not unnecessarily obscure the embodiments herein. The examples used herein are intended merely to facilitate an understanding of ways in which the embodiments herein may be practiced and to further enable those of skill in the art to practice the embodiments herein. Accordingly, the examples should not be construed as limiting the scope of the embodiments herein.

[0038] As mentioned, there remains a need for a system for real-time traffic management on single lane roads. The embodiments herein achieve this by providing a moving drone traffic light or a vehicle assistance system to obtain traffic information and provide guidance to vehicles. Referring now to the drawings, and more particularly to FIGS. 1A through 8, where similar reference characters denote corresponding features consistently throughout the figures, preferred embodiments are shown.

[0039] FIG. 1A illustrates a system view of a system for obtaining traffic information on a single lane road and providing signals to one or more vehicles in a real-time using one or more moving drones according to a first embodiment herein. The system includes one or more first moving drone 102A on a first side of the road, one or more second moving drones 102B on the second side of the road, a traffic management server 104, one or more first side vehicles 108A1-A2 and one or more second side vehicles 108B1-B3. The one or more first moving drones 102A on the first side of road and the one or more second moving drones 102B on the second side of the road are connected to the traffic management server 104 and also in communication with each other. The traffic management server 104 receives the media content the one or more moving drones (102A, 102B), analyses it to compute positions of one or more vehicles (108A1-A2, 108B1-B3) on the road ahead of time and provide a selection of recommendations to a single vehicle or a group of vehicles to safely manage the traffic on the road. The one or more first moving drones 102A include a camera or a radar or a depth sensor that captures media content of the road and the one or more first side vehicles 108A1 and 108A2 as shown in FIG. The one or more second moving drones 102B include a camera or a radar or a depth sensor that captures media content of the road and the one or more second side vehicles 108B1, 108B2 and 108B3. In an embodiment, the drones include traffic light indicators to guide the vehicles. The one or more first moving drones 102A hover at an altitude on a first side of the single lane road. The one or more second moving drones 102 B hover at the same altitude on a second side of the single lane road. In one embodiment, the altitude ranges are 20-100 feet (at a minimum like a traffic light) above a road level. The one or more first side vehicles travel in a first direction on the first side of the single lane road. The one or more second side vehicles travel in a second direction (i.e. opposite direction) on the second side of the single lane road. The one or more moving drones (102A, 102B) may adjust the altitude from the road level to ensure visibility to vehicle drivers. The one or more moving

drones (102A, 102B) are controlled or operated by the traffic management server 104. In an embodiment, the traffic management server 104 functions as a control unit for the drones.

[0040] The traffic management server 104 receives a media content from an area between a first point and a second point of a road. The media content is captured using one or more devices. The traffic management server 104 transforms the media content to a machine readable media content. The traffic management server 104 processes the machine-readable media content The processing including (i) generating a database of one or more vehicles (108A1-A2, 108B1-B3) present in the area between the first point and the second point of the road and tagging the one or more of vehicles (108A1-A2, 108B1-B2) as per their position; (ii) computing a speed of each of the one or more vehicles (108A1-A2, 108B1-B3) from a first position of a vehicle from the media content captured at a first instance and a second position of the vehicle from the media content captured at a second instance, (iii) classifying the one or more vehicles (108A1-A2, 108B1-B3) into a first set of vehicles and a second set of vehicles based on a range of speed (iv) predicting a position of each of the one or more vehicles (108A1-A2, 108B1-B3) based on the speed ahead of time, (v) determining gaps that exceed a threshold distance between the first set of the vehicles and the second set of vehicles, (v) computing a potential length of a gap between the first set of vehicles and the second set of vehicles and (vi) identifying a vehicle crossing the threshold distance of the gap ahead of time from the first set of vehicles and the second set of vehicles. The traffic management server 104 generates recommendation including a speed suggestion to each of the one or more vehicles ahead of time to maintain the gap between the first set of vehicles and the second set of vehicles. The traffic management server 104 provides recommendations for overtaking or continuing in a lane to each of the one or more of vehicles.

[0041] In an embodiment, the one or more vehicles (108A1-A2, 108B1-B3) may decide on their own whether to be a member of a group of vehicles or to function individually. In an embodiment, the one or more vehicles (108A1-A2, 108B1-B3) may move faster and safer when they cooperate with the group of vehicles. The traffic management server 104 computes based the movement of the group of vehicles on the first side and the second side, safe gaps to overtake and speed recommendations. In an embodiment, the traffic management server 104 further updates the database of the vehicles that have followed the recommendations and provides an incentive for each vehicle in the groups when they cooperate. In an embodiment,

the traffic management server 104 provides large incentives for the one or more vehicles (108A1-A2, 108B1-B3) when they allow other vehicles to overtake. In another embodiment, the traffic management server 104 provides penalties for the one or more vehicles (108A1-A2, 108B1-B3) when they violate the signals provided by the one or more moving drones (102A, 102B) or explicitly seek to move faster by paying the penalty. In an embodiment, the incentives and penalties are monetary. In another embodiment, the incentives and penalties for following the recommendations are reduced or increased travel time by receiving priority clearance for the vehicles following recommendations as computed by the traffic management server 104.

[0042] The one or more moving drones (102A, 102B) may include one or more depth determining radars and one or more high-resolution cameras. The one or more depth determining radars and the one or more high-resolution cameras obtains the traffic information from the single lane road in a real-time. In an embodiment, the traffic information includes but it is not limited to (i) number or count of the one or more vehicles (108A1-A2, 108B1-B3), (ii) position of the one or more vehicles (108A1-A2, 108B1-B3), (iii) speed of the one or more vehicles (108A1-A2, 108B1-B3) and (iv) gaps that are continuous length of road without a vehicle, in the first side and the second side. The one or more moving drones (102A, 102B) communicate the traffic information to the traffic management server 104. The one or more moving drones (102A, 102B) may charge in nearby charging stations.

[0043] The traffic management server 104 analyzes the traffic information and performs future traffic evaluation. The future traffic evaluation is performed virtually to evaluate future traffic using a traffic evaluation technique. The future traffic evaluation is determined based on (i) gaps, (ii) waiting time, (iii) expected crossing time, (iv) overtaking time, (v) a type of the one or more vehicles (108A1-A2, 108B1-B3), (vi) a size of the one or more vehicles (108A1-A2, 108B1-B3), (vii) the current position of the one or more vehicles (108A1-A2, 108B1-B3), (vii) a width of the single lane road and (ix) a priority order for the one or more vehicles (108A1-A2, 108B1-B3). In an embodiment, the type and the size of the one or more vehicles (108A1-A2, 108B1-B3) are detected using a vehicle detection technique.

[0044] The traffic management server 104 generates and communicates commands to the one or more moving drones (102A, 102B). The commands are generated based on the length of the single lane road yet to be traveled, the traffic information obtained and the future

traffic evaluation. The commands include but it is not limited to (i) a speed control command, (ii) a nature of road command, (iii) a safety overtake command and (iv) a hold command. The speed control command is provided to (a) create the group of vehicles and (b) create the gaps for overtaking. The safety overtake command is provided when the gap available for overtaking is more than a threshold gap and the overtaking time is less than an expected crossing time. The threshold gap is a minimum amount of gap that is required for the group of vehicles to overtake. The threshold gap may vary depending on the size of the vehicles (108A1-A2, 108B1-B3). The overtaking time is a minimum amount of time required for overtaking. The expected crossing time is a minimum amount of time required for the vehicles traveling in the opposite direction to meet. The hold command is provided when the gap available for overtaking is less than the threshold gap and the overtaking time is more than the expected crossing time.

[0045] The one or more moving drones 102 provide signals to the one or more vehicles (108A1-A2, 108B1-B3) based on the commands received from the traffic management server 104. The signals include (a) a speed control signal, (b) a hold signal, (c) a safety overtake signal, and (d) a nature of road signal. The speed control signal is provided for one or more vehicles (108A1-A2, 108B1-B3) in the single lane road to form as a group of vehicles in the first side and the second side and to create the gaps between the groups of vehicles for overtaking. The groups of vehicles may be groups of fast-moving vehicles and groups of slow-moving vehicles. The one or more vehicles that are moving faster than threshold speed are grouped under the group of fast-moving vehicles. The one or more vehicles that are moving slower than threshold speed are grouped under the group of slow-moving vehicles. The threshold speed may be varied. The group of fast-moving vehicles and the group of slow-moving vehicles are obtained by allowing the fast moving vehicles for short skip are overtaking of slow-moving vehicles. The gaps may increase or decrease depending on the relative speed of the groups of the vehicles. The traffic evaluation technique further captures and monitors the gaps between the group of vehicles to provide the hold signal or the safety overtake signal. The hold signal is provided to stop or slow down the group of vehicles iteratively on the first side and the second side to create gaps for overtaking. The safety overtake signal provided to the group of vehicles in the first side to safely overtake the slow-moving vehicles without affecting or disturbing the movement of the groups of vehicles in the second side and vice

versa.

[0046] The one or more moving drones (102A, 102B) further (i) ensures that the gaps are large enough for the group of vehicles in the other side to overtake, (ii) breaks down the group of vehicles to allow fewer vehicles of the group to overtake when the gap is not sufficient to overtake and (iii) tracks the cooperative nature of the vehicles in the group. The one or more moving drones (102A, 102B) determines and ensures the gaps by simulating the single lane road as a server in the queuing system, and the one or more vehicles (108A1-A2, 108B1-B3) are simulated as a serving item. The faster the vehicle moves, the more vehicles can be served in a unit of time. Therefore, there is an arrival rate and service rate for vehicles from the point of view of the single lane road. An arrival rate is a number of vehicles in each direction, and the service rate is the speed at which the vehicle is moving. When the speed of the vehicles is slow, the vehicles will be back to back waiting for the single lane road ahead to service them. Each group is served differentially as a single unit. The one or more moving drones (102A, 102B) breaks down the group of vehicles through the speed control command. The cooperative nature of the vehicles and the gaps for overtaking are determined using at least one of GPS, road coordinates estimation technique, etc. The cooperative nature of the vehicles is determined to provide incentives for the vehicles.

[0047] The one or more moving drones (102A, 102B) include one or more traffic light displays. The one or more traffic light displays display or provide signals to the group of vehicles on the respective side. In an embodiment, the signals are displayed based on the commands received from the traffic management server 104. The one or more traffic light displays display the safety overtake signal to the group of vehicles to safely overtake the slow-moving vehicles without affecting or disturbing a movement of the group of the vehicles in the other side. The one or more traffic light displays display the hold signal to the group of vehicles to hold the group of vehicles to allow overtaking for the group of vehicles on the other side. The hold signal or safety overtake signal is provided based on a priority order for the group of vehicles.

[0048] The one or more traffic light displays display the speed control signal when the traffic management server 104 detects at least one of (i) a damaged nature or a curved nature of the road and (ii) an obstacle in the single lane road. The nature of the road may be at least one of curved, straight or damaged. The nature of the road may be computed using the one or

more high-resolution cameras positioned in the one or more moving drones. In an embodiment, the one or more moving drones (102A, 102B) capture images of the vehicles that are violating the commands or signals and reports to traffic police using the images captured.

[0049] FIG.1B illustrates a system view for obtaining traffic information on the single lane road and providing signals to individual vehicles in a real-time using one or more vehicle assistance systems according to an embodiment herein. The vehicle assistance system 106 has an interface to take input from a driver or passenger travelling in a vehicle and also displays recommendations from the traffic management server 104. In an embodiment, the vehicles 108A1 and 108A2 on a first side of road have the vehicle assistance systems 106A1 and 106A2 respectively and the vehicles 108B1, 108B2 and 108B3 have the vehicle assistance systems 106B1, 106B2 and 106B3 respectively. In an embodiment, each vehicle assistance system 106 is incorporated into a dashboard or a device in each vehicle. In an embodiment, the vehicle assistance system 106 is in communication with a mobile device of the driver or a passenger in a vehicle. The one or more vehicles (108A1-A2, 108B1-B3) are connected with one another using the one or more vehicle assistance systems (106A1-A2, 106B1-B3). In one embodiment, the one or more vehicle assistance systems (106A1-A2, 106B1-B3) obtain the traffic information from the single lane road using at least one of (a) a GPS module, or (b) road coordinates obtaining module embedded in the one or more vehicles (108A1-A2, 108B1-B3). In another embodiment, the one or more vehicle assistance systems (106A1-A2, 106B1-B3) obtain the traffic information using the one or more depth determining radars and one or more high-resolution cameras that are positioned in the one or more moving drones (102A, 102B) as described in FIG.1B. The vehicle assistance system (106A1-A2, 106B1-B3) may include a dashboard console to show the vehicles around the vehicle in real-time. The one or more vehicle assistance systems (106A1-A2, 106B1-B3) communicate the traffic information to the traffic management server 104. The traffic management server 104 analyzes the traffic information and performs traffic evaluation (as described in FIG.1) to provide signals to the individual vehicles through the respective vehicle assistance systems (106A1-A2, 106B1-B3). In an embodiment, the one or more vehicle assistance systems (106A1-A2, 106B1-B3) control or operates the one or more vehicles (108A1-A2, 108B1-B3) based on the signals received from the traffic management server 104.

[0001] In an embodiment, the vehicle assistance system (106A1-A2, 106B1-B3)

further includes a collision avoidance mechanism incorporated in the respective vehicle to handle collision avoidance. The collision avoidance mechanism ensures the safety of the respective vehicle using distance thresholds and issuing signal or warning when the distance between the vehicles is less than threshold distance. In an embodiment, the threshold distance is calculated based on the speed of one or more vehicles at future traffic evaluation module 408. The vehicle assistance system (106A1-A2, 106B1-B3) functions both during day and night using the one or more depth determining radars, the high-resolution cameras and other sensor technologies available. The vehicle assistance system (106A1-A2, 106B1-B3) provides time information (e.g., Expected time arrival, etc.) to the destination and other information (e.g., nature of the road, traffic status) for commuters in the respective vehicles to take decisions if required.

[0002] FIG. 2 illustrates an exploded view of the moving drone (102A, 102B) of FIG.1A according to an embodiment herein. The moving drone (102A, 102B) includes one or more depth determining radars 202A-N, one or more high-resolution cameras 204A-N to capture position of vehicles, speed, and to determine a condition of the road and an existence of traffic congestion or other road safety related information e.g. land slide, vehicular accidents, presence of ambulance, presence of landslide clearing or towing vehicle, fire, presence of police cars etc. to be fed to the traffic evolution and management system in order to issue relevant recommendations to relevant vehicles as determined, and a traffic light display 206. The traffic light display 206 includes a speed control signal display 208, a safety overtake signal display 210, a hold signal display 212 and a nature of road display 214. The speed control signal display 208 displays the speed control for the one or more vehicles (108A1-A2, 108B1-B3) to move when the traffic light display receives a speed control command from the traffic management server 104. The safety overtakes signal to display 210 displays the safety overtake signal when the traffic light display receives a safety overtake command from the traffic management server 104. The hold signal display 212 displays the hold signal when the traffic light display receives a hold command from the traffic management server 104. The nature of road display 214 displays the nature of the road signal when the traffic light display receives a nature of road command from the traffic management server 104.

[0003] FIG. 3 illustrates an exploded view of the vehicle assistance system (106A1, 106A2, 106B1, 106B2, 106B3) of FIG.1B according to an embodiment herein. The vehicle

assistance system (106A1, 106A2, 106B1, 106B2, 106B3) includes a traffic management database 302, a traffic information obtaining module 304, a traffic information communication module 306, a command receiving module 308 and a vehicle guidance module 310. The traffic information obtaining module 304 obtains the traffic information from the one or more vehicles (108A1-A2, 108B1-B3). In an embodiment, the traffic information obtaining module 304 obtains the traffic information using the one or more depth determining radars 202A-N and the one or more high-resolution cameras 204A-N positioned in the one or more moving drones (102A and 102B). In another embodiment, the traffic information obtaining module 304 obtains the traffic information using at least one of GPS module or the road coordinates obtaining module embedded in the one or more vehicles (108A1-A2, 108B1-B3). The traffic information communication module 306 communicates the traffic information to the traffic management server 104. The command receiving module 308 receives the commands from the traffic management server 104. The vehicle guidance module 310 guides the respective individual vehicles by providing the signals to the individual vehicles via the respective dashboard displays. The signals are verified and updated in real-time by maintaining the gap between groups of vehicles. The gaps between the groups of vehicles are maintained by monitoring the threshold gaps and fine-tuning the speed of the vehicles. In an embodiment, the vehicle assistance system (106A1, 106A2, 106B1, 106B2, 106B3) further includes a command execution module (not shown in FIG. 3) that automatically controls or operates the respective vehicle based on the commands received from the traffic management server 104.

[0050] FIG. 4 illustrates an exploded view of the traffic management server 104 of FIG.1 according to an embodiment herein. The traffic management server 104 includes a traffic evaluation database 402, a traffic information receiving module 404, a traffic information analysis module 406, a future traffic evaluation module 408, a command generation module 410 and a command communication module 412. The traffic information receiving module 404 receives the traffic information from at least one of (a) the one or more moving drones 102 or (b) the one or more vehicle assistance systems 106. The traffic information analysis module 406 analyses the traffic information. The future traffic evaluation module 408 performs traffic evaluation virtually using a traffic evaluation technique based on the queuing principle.

[0051] The command generation module 410 generates commands for the one or more

vehicles (108A1-A2, 108B1-B3) based on the future traffic evaluation. The command generation module 410 further provides commands to provide incentives or penalties to the one or more vehicles (108A1-A2, 108B1-B3) based on the cooperative nature of the one or more vehicles (108A1-A2, 108B1-B3). The command communication module 414 communicates the commands to at least one of (a) the one or more moving drones 102 or (b) the one or more vehicle assistance systems 106. In an embodiment, determining a vehicle that has followed the recommendations; and updating the database (402) with vehicle information comprising a position and a speed of the vehicle.

[0004] FIG. 5 is a flow diagram illustrating a method for obtaining and communicating the traffic information and guiding the individual vehicles in the real-time using one or more vehicle assistance systems of FIG. 1B according to an embodiment herein. At step 502, the traffic information is captured from the road by means of (a) the one or more depth sensors or determining radars 202A-N or the one or more high-resolution cameras 204A-N positioned in the one or more moving drones 102 or (b) the GPS module or the road coordinates obtained from one or more vehicle assistance systems 106 coupled in with the one or more vehicles (108A1-A2, 108B1-B3). At step 504, the traffic information is communicated to the traffic management server 104 using a wireless communication network. At step 506, the commands for the individual vehicles are received from the traffic management server 104. At step 508, the signals are provided via the respective dashboard displays to guide the respective vehicles. In an embodiment, the one or more vehicle assistance systems 106 execute the commands by operating the one or more vehicles (108A1-A2, 108B1-B3) based on the commands.

[0005] FIG. 6 is a flow diagram illustrating a method for obtaining and communicating the traffic information and assisting the vehicles in the real-time using the one or more moving drones of FIG. 1A according to an embodiment herein. At step 602, the traffic information is obtained using the one or more depth determining radars 202A-N and the one or more high-resolution cameras 204A-N positioned in the one or more moving drones (102A, 102B). At step 604, the traffic information is communicated to the traffic management server 104 using a wireless communication network. At step 606, the commands for the one or more vehicles (108A1-A2, 108B1-B3) are received from the traffic management server 104. At step 608, the guidance for the one or more vehicles (108A1-A2, 108B1-B3) is provided by displaying the signals using the one or more traffic light displays.

[0006] FIG. 7 is a flow diagram illustrating a method for receiving the traffic information and providing signals using the traffic management server 104 of FIG. 1A according to an embodiment herein. At step 702, the traffic information is received from at least one of (i) the one or more moving drones 102 or (ii) the one or more vehicle assistance systems 106. At step 704, the traffic information is analyzed to detect (i) the number or count of the one or more vehicles (108A1-A2, 108B1-B3), (ii) the position of the one or more vehicles (108A1-A2, 108B1-B3) and (iii) the speed of the one or more vehicles (108A1-A2, 108B1-B3). At step 706, the future traffic evaluation is performed using the traffic evaluation technique based on the analysis of the traffic information. At step 708, the commands for the one or more vehicles (108A1-A2, 108B1-B3) are generated based on the future traffic evaluation. At step 710, the commands are communicated to at least one of (i) the one or more moving drones 102 or (ii) the one or more vehicle assistance systems 106.

[0007] A representative hardware environment for practicing the embodiments herein is depicted in FIG. 8. This schematic drawing illustrates a hardware configuration of an information handling/computer system in accordance with the embodiments herein. The system comprises at least one processor or central processing unit (CPU) 10. The CPUs 10 are interconnected via system bus 12 to various devices such as a random access memory (RAM) 14, read-only memory (ROM) 16, and an input/output (I/O) adapter 18. The I/O adapter 18 can connect to peripheral devices, such as disk units 11 and tape drives 13, or other program storage devices that are readable by the system. The system can read the inventive instructions on the program storage devices and follow these instructions to execute the methodology of the embodiments herein.

[0008] The system further includes a user interface adapter 19 that connects a keyboard 15, mouse 17, speaker 24, microphone 22, and/or other user interface devices such as a touch screen device (not shown) or a remote control to the bus 12 to gather user input. Additionally, a communication adapter 20 connects the bus 12 to a data processing network 25, and a display adapter 21 connects the bus 12 to a display device 23 which may be embodied as an output device such as a monitor, printer, or transmitter, for example.

[0009] The one or more moving drones may move to spot and obtain the traffic information irrespective of the traffic congestion. The one or more moving drones and the vehicle assistance systems may minimize the risk from the driver side and ensure the safety of

the vehicles. The one or more moving drones and the vehicle assistance system may further minimize the consumption of resources and provide seamless traffic movement.

[0010] The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the spirit and scope of the appended claims.

CLAIMS

I/We claim:

1. A system for traffic evaluation and management, wherein the system comprises:

a traffic management server (104) comprising:

a storage device; and

a processor in communication with the storage device, wherein the processor executes machine readable instructions to perform:

receiving a media content from an area between a first point and a second point of a road, wherein the media content is captured using a plurality of devices;

characterized in that,

transforming the media content to machine readable media content;

processing the machine-readable media content, wherein said processing comprising:

generating a database of a plurality of vehicles present in the area between the first point and the second point of the road and tagging the plurality of vehicles as per their position;

computing a speed of each of the plurality of vehicles from a first position of a vehicle from the media content captured at a first instance and a second position of the vehicle from the media content captured at a second instance;

classifying the plurality of vehicles into a first set of vehicles and a second set of vehicles based on a range of speed;

predicting a position of each of the plurality of vehicles based on the speed ahead of time;

determining gaps that exceed a threshold distance between the first set of the vehicles and the second set of vehicles;

computing a potential length of a gap between the first set of vehicles and the second set of vehicles; and

identifying a vehicle crossing the threshold distance of the gap ahead of time from the first set of vehicles and the second set of vehicles;

generating recommendation comprising a speed suggestion to each of the plurality of vehicles ahead of time to maintain the gap between the first set of vehicles and the second set of vehicles; and

providing recommendations for overtaking or continuing in a lane to each of the plurality of vehicles.

2. The system as claimed in claim 1, wherein the processor executes machine readable instructions for performing:

determining a vehicle that has followed the recommendations; and

updating the database (402) with vehicle information comprising a position and a speed of the vehicle.

3. The system as claimed in claim 1, wherein the system comprises:

a control unit that

receives an input of information of the road, and a position of each vehicle on the road, wherein the road is straight or curved road, wherein the input is communicated by (a) a plurality of moving drones that captures a vehicular traffic information from the road using at least one sensor or at least one camera or (b) a vehicle assistance module that is incorporated in a communication device of each of the plurality vehicle;

determines a number of vehicles on a length of the road; and

captures and communicates relative positions of the plurality of vehicles to the traffic management server (104).

4. The system as claimed in claim 1, wherein the processor executes machine readable instructions for performing:

generating a multi agent simulation to visualize the traffic information comprising the position of the plurality of vehicles ahead of time; and

identifying gaps to overtake for a vehicle in real time.

5. The system as claimed in claim 1, wherein the processor executes machine readable instructions for performing:

identifying a traffic congestion when the plurality of vehicles moves at a speed less than a predetermined threshold for more than a predetermined duration at a traffic information analysis module;

identifying points and vehicles at the points at a traffic information analysis module (406) of said system; and

generating commands at a command generation module (410) to the vehicles to increase or decrease the speed or to overtake a vehicle that is running in front.

6. The system as claimed in claim 1, wherein when the road is single lane road, the processor executes machine readable instructions to perform:

identifying a traffic congestion when the plurality of vehicles on the first side of the road moving at speed less than a predetermined threshold for more than a predetermined duration;

identifying points and vehicles at the points on a second side of the single lane road;

generating commands at a command generation module (410) to the vehicles at the points on the second side of the single lane road to increase or decrease the speed to generate gaps for vehicles on the first side of the single lane road to enable the second side vehicle to overtake at precomputed cross points;

determining a duration for crossing the cross points by a plurality of vehicles on the first side of the single lane road and a plurality of vehicles on the second side of the single lane road; and

de-recognizing the cross points when the traffic congestion is cleared.

7. The system as claimed in claim 1, wherein the system comprises a plurality of moving drones with traffic lights that capture vehicular traffic information from the road using at least one sensor or at least one camera, wherein the plurality of moving drones captures data comprising:

(a) a number of vehicles on the road;

(b) a position of each vehicle on the road;

(c) a condition of the road with respect to the position of the vehicle, and communicates the data to a control unit and receives an instruction from the control unit to display traffic signal to an optimal speed and optimal height for visibility to the drivers of the vehicles.

8. The system as claimed in claim 1, wherein the control unit issues a speed recommendation to a vehicle on the first side of the road and after the recommendation is accepted, adds the vehicle to either the first set of vehicles or the second set of vehicles.

9. A method for traffic evaluation and management, said method comprising:

receiving a media content from an area between a first point and a second point of a road, wherein the media content is captured using a plurality of devices;

characterized in that,

transforming the media content to machine readable media content;

processing of the machine-readable media content, wherein said processing comprises the steps of:

generating a database of a plurality of vehicles present in the area between the first point and the second point of the road and tagging the plurality of vehicles as per their position;

computing a speed of each of the plurality of vehicles from a first position of the vehicle from the media content captured at a first instance and a second position of the vehicle from the media content captured at a second instance;

classifying the plurality of vehicles into a first set of vehicles and a second set of vehicles based on a range of speed;

predicting a position of each of the plurality of vehicles based on the speed ahead of time;

determining the gaps that exceed a threshold distance between the first set of the vehicles and the second set of vehicles;

computing a potential length of a gap between the first set of vehicles and the second set of vehicles; and

identifying a vehicle crossing the threshold distance of the gap ahead of time from the first set of vehicles and the second set of vehicles;

generating recommendation comprising a speed suggestion to each of the plurality of vehicles ahead of time to maintain the gap between the first set of vehicles and the second set of vehicles; and

providing recommendations for overtaking or continuing in a lane to be sent to each of the plurality of vehicles.

10. The method as claimed in claim 9, wherein the method comprises the steps of:

identifying a traffic congestion when a plurality of vehicles on the first side of the road moving at speed less than a predetermined threshold for more than a predetermined duration;

identifying points and vehicles at the points on a second side of the single lane road;

generating commands at a command generation module (410) to the vehicles at the points on the second side of the single lane road to increase or decrease the speed to generate gaps for vehicles on the first side of the single lane road to enable the second side vehicle to overtake at precomputed cross points;

determining a duration for crossing the cross points by a plurality of vehicles on the first side of the single lane road and a plurality of vehicles on the second side of the single lane road; and

de-recognizing the cross points when the traffic congestion is cleared.

Signature of the patent Agent:
(Bala Arjun Karthik)
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ABSTRACT

SYSTEM AND METHOD FOR REAL-TIME TRAFFIC MANAGEMENT

A method for real-time traffic management is provided. The method includes the steps of (a) receiving a media content captured at the road and transforming the media content to machine readable media content, (b) generating a database of a plurality of vehicles present in the area between the first point and the second point of the road and tagging them as per their position, (c) computing the speed of each of the plurality of vehicles from a position of the vehicle from the media content captured, (d) predicting positions of each of plurality the of vehicles based on the speed ahead of time, (e) determining the gaps that exceed threshold distance between the first set of the vehicles and the second set of vehicles, (f) generating recommendation comprising a speed suggestion to selected vehicle ahead of time to maintain the gap between the first and the second set of vehicles, and (g) providing recommendations for overtaking or continuing in the lane to a vehicle.

FIG.1A

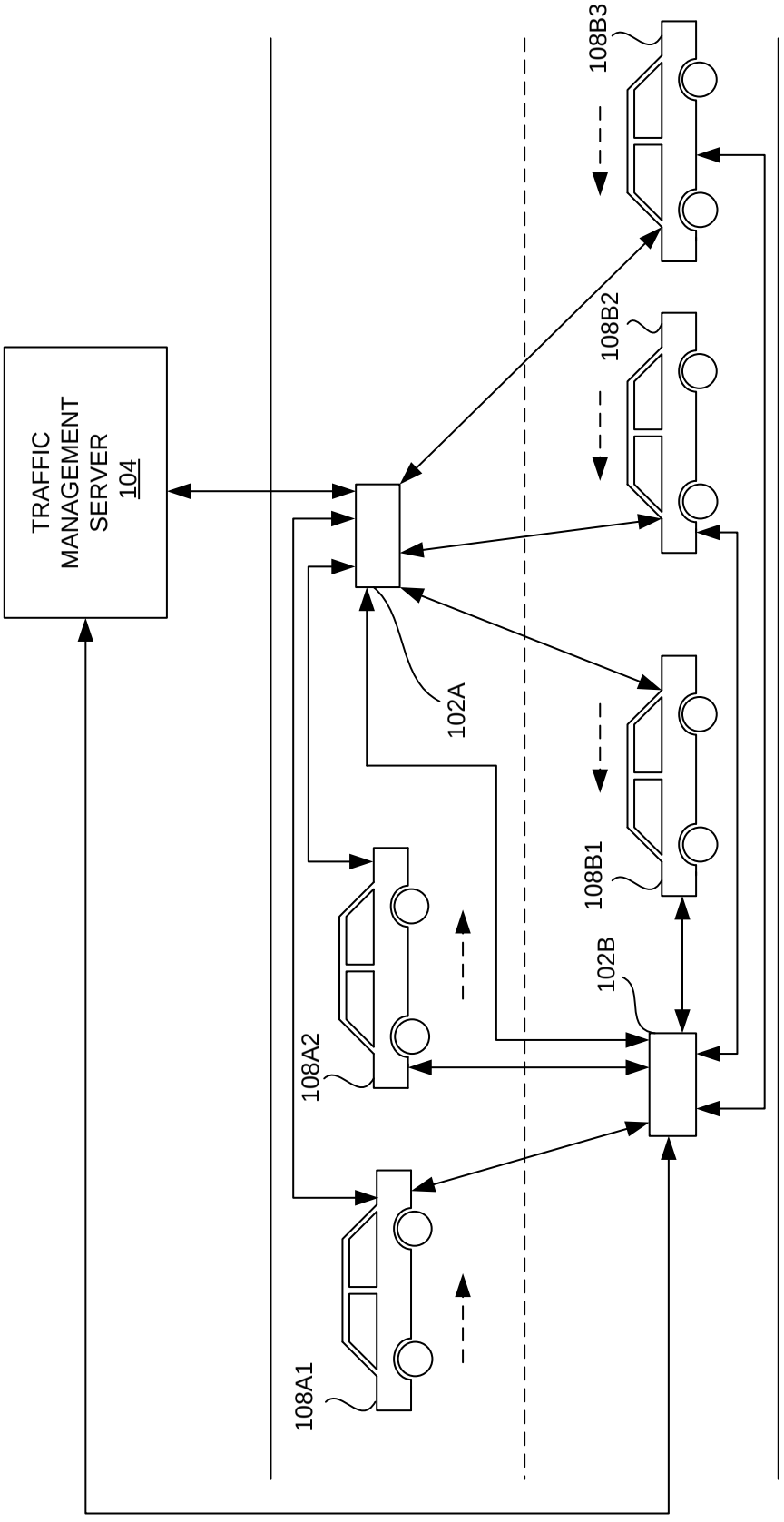

FIG. 1A

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(BALA ARJUN KARTHIK)
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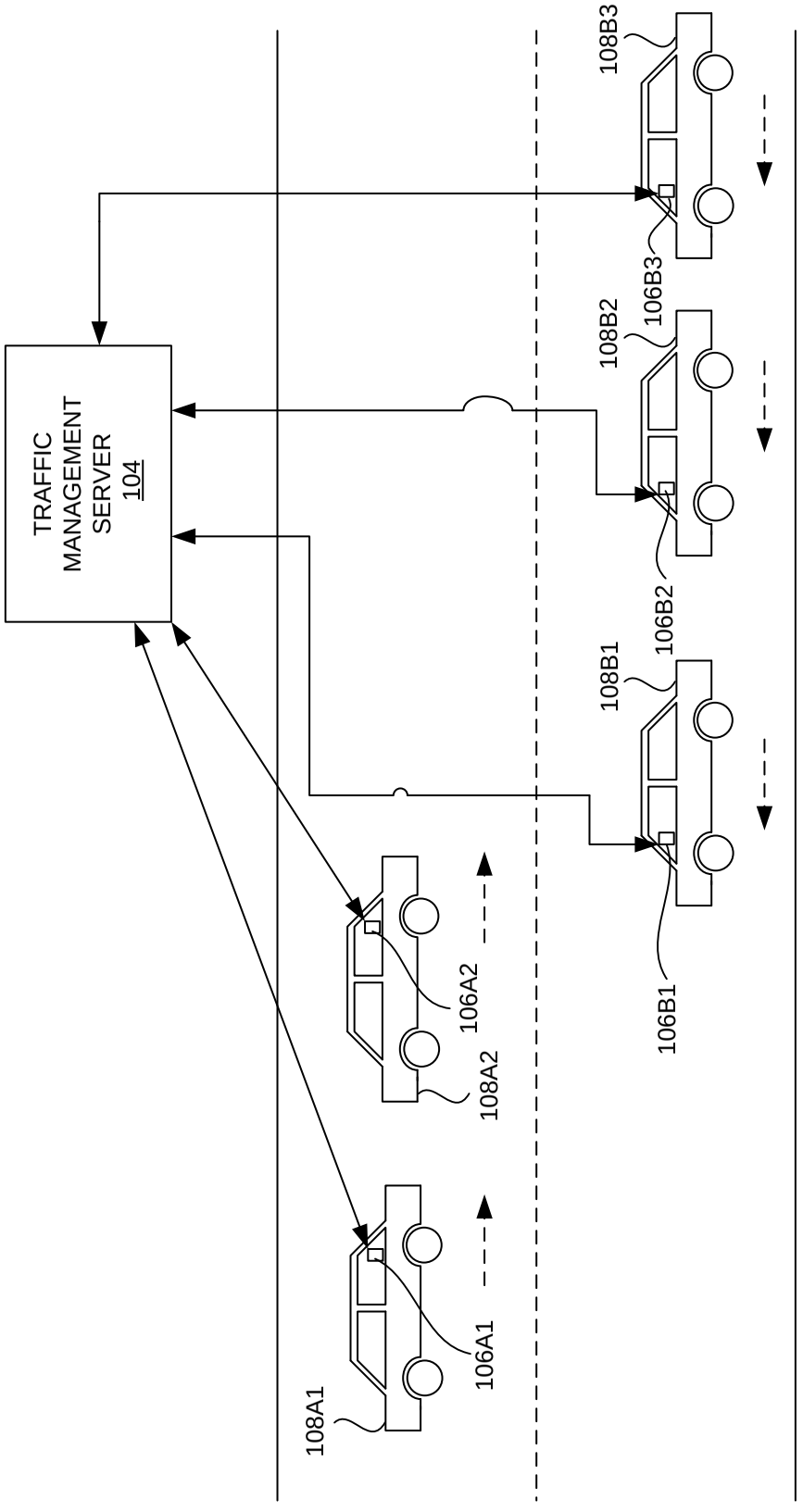

FIG. 1B

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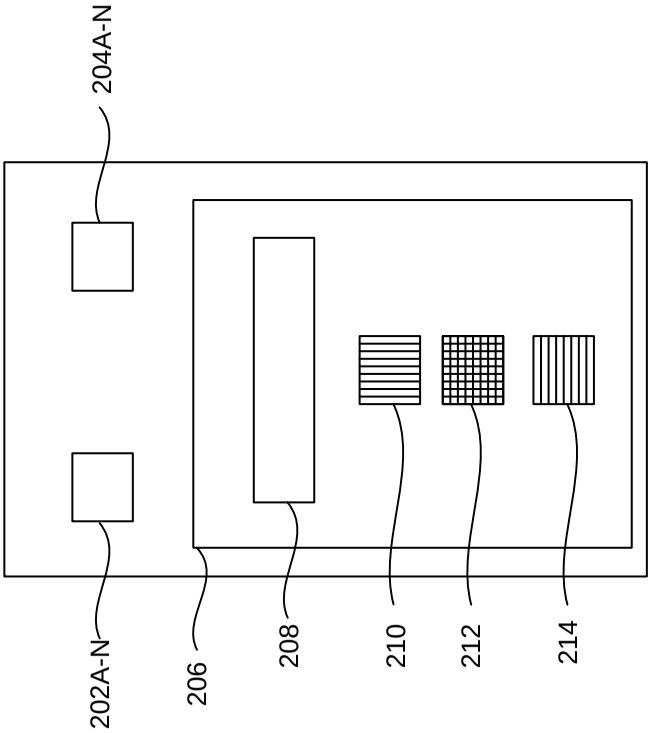

FIG. 2

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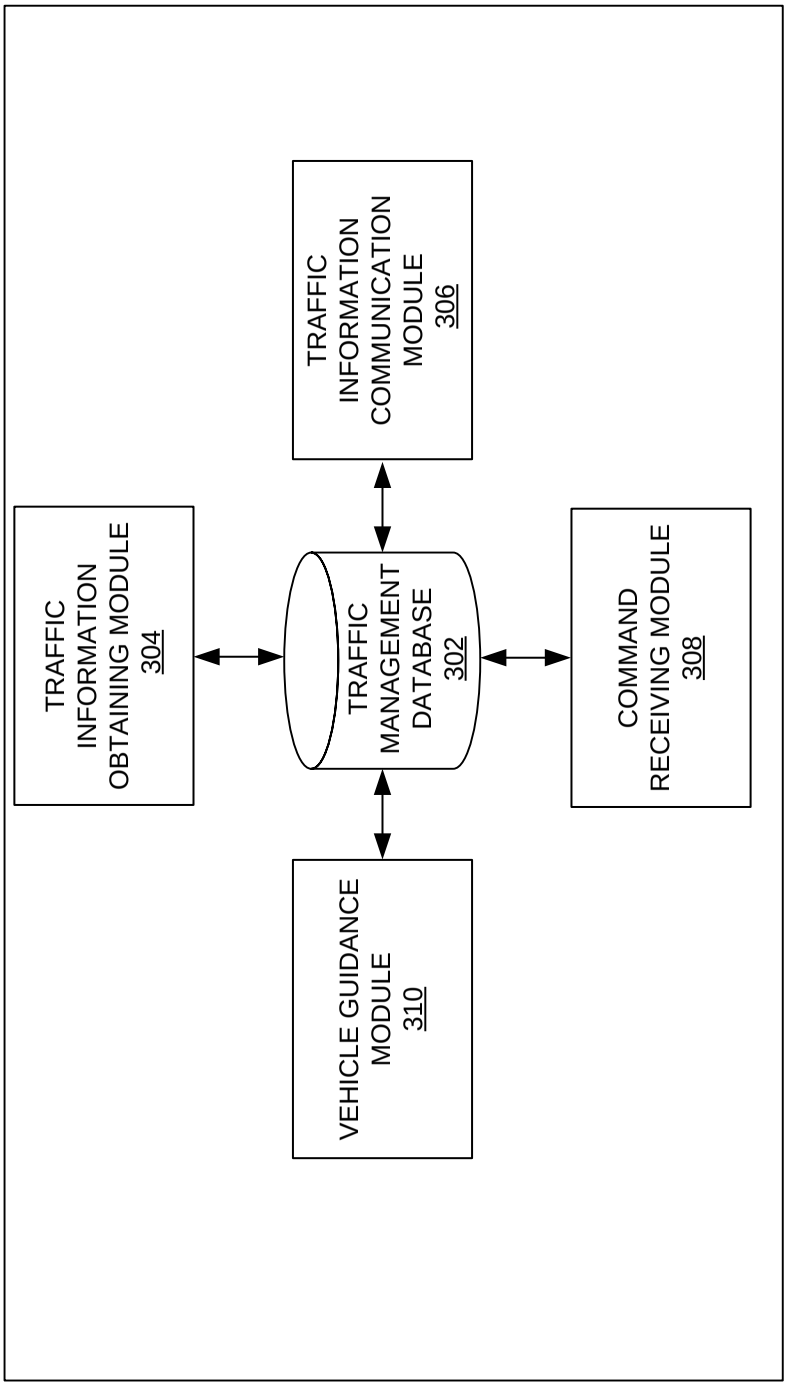

FIG. 3

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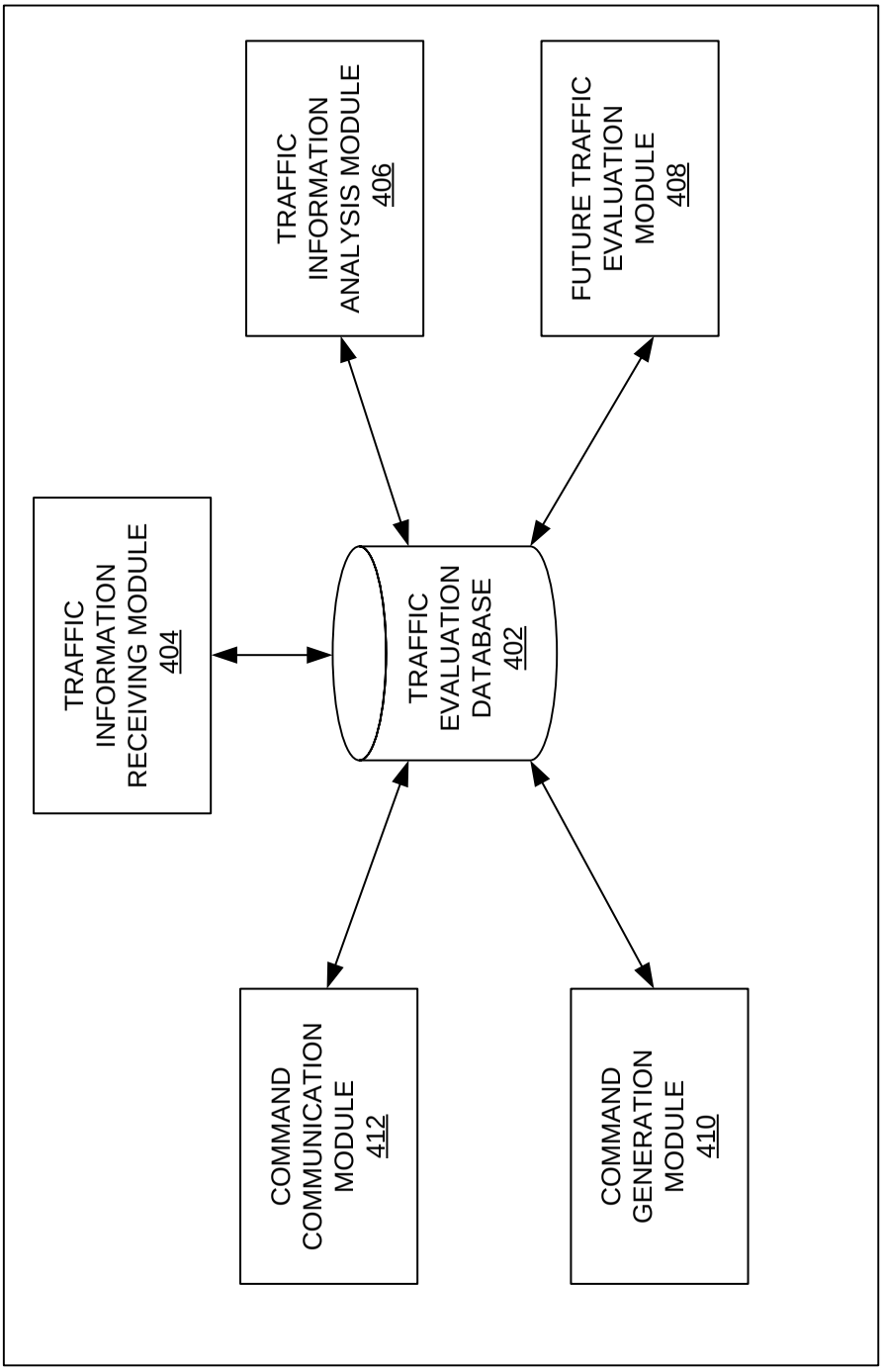

FIG. 4

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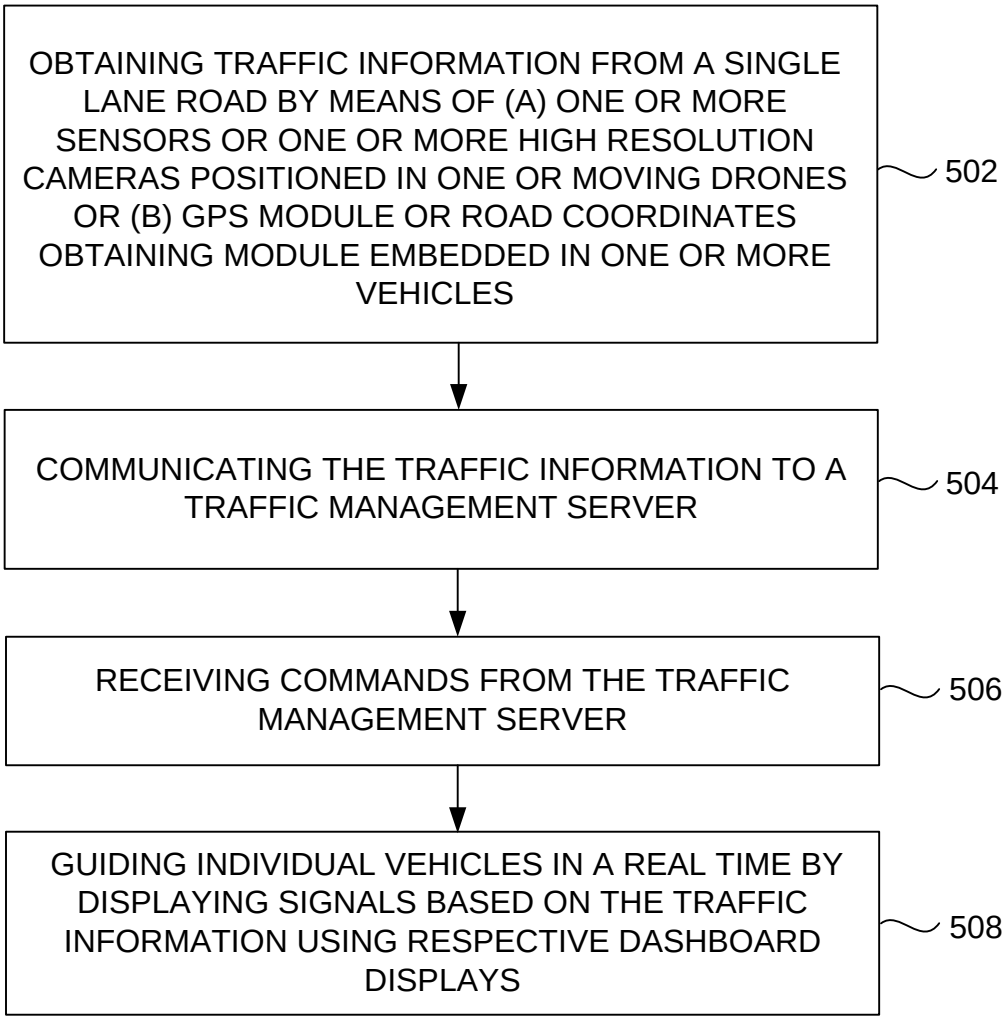

FIG. 5

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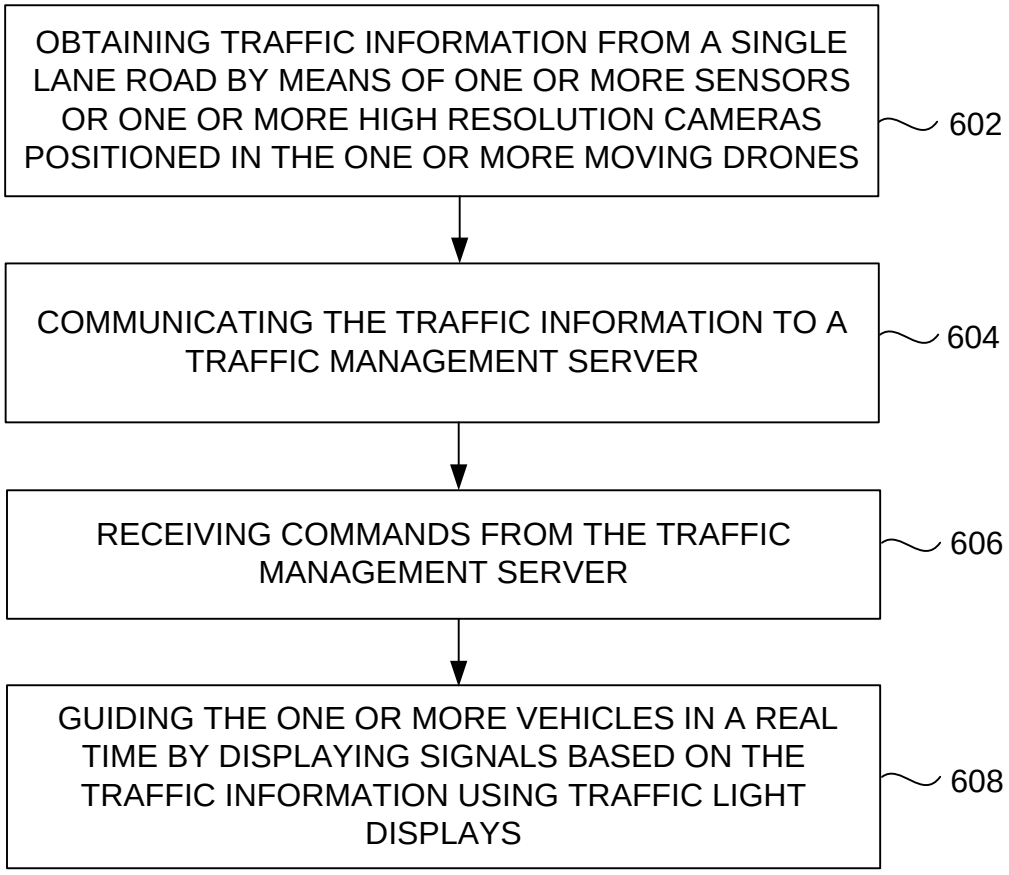

FIG. 6

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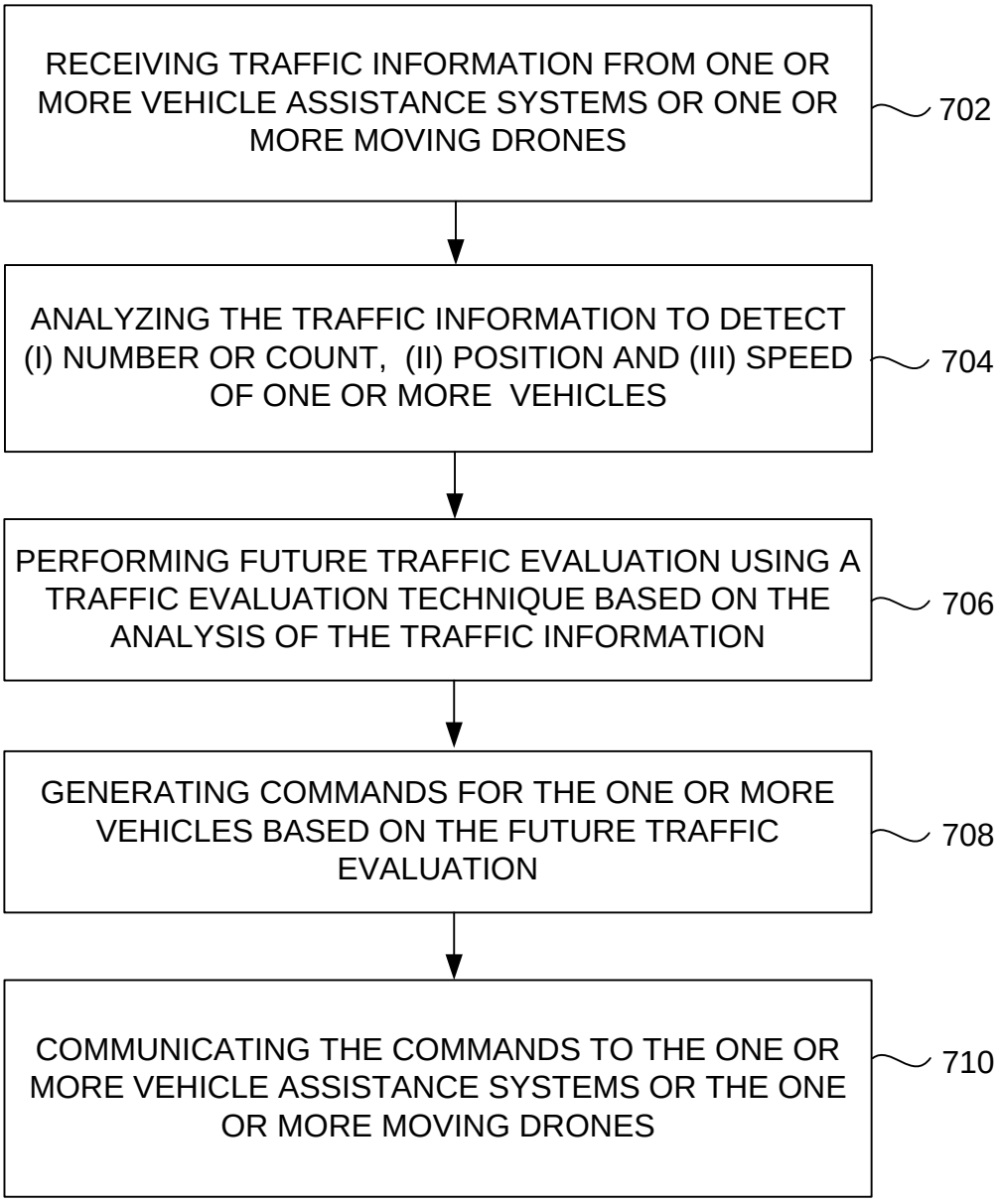

FIG. 7

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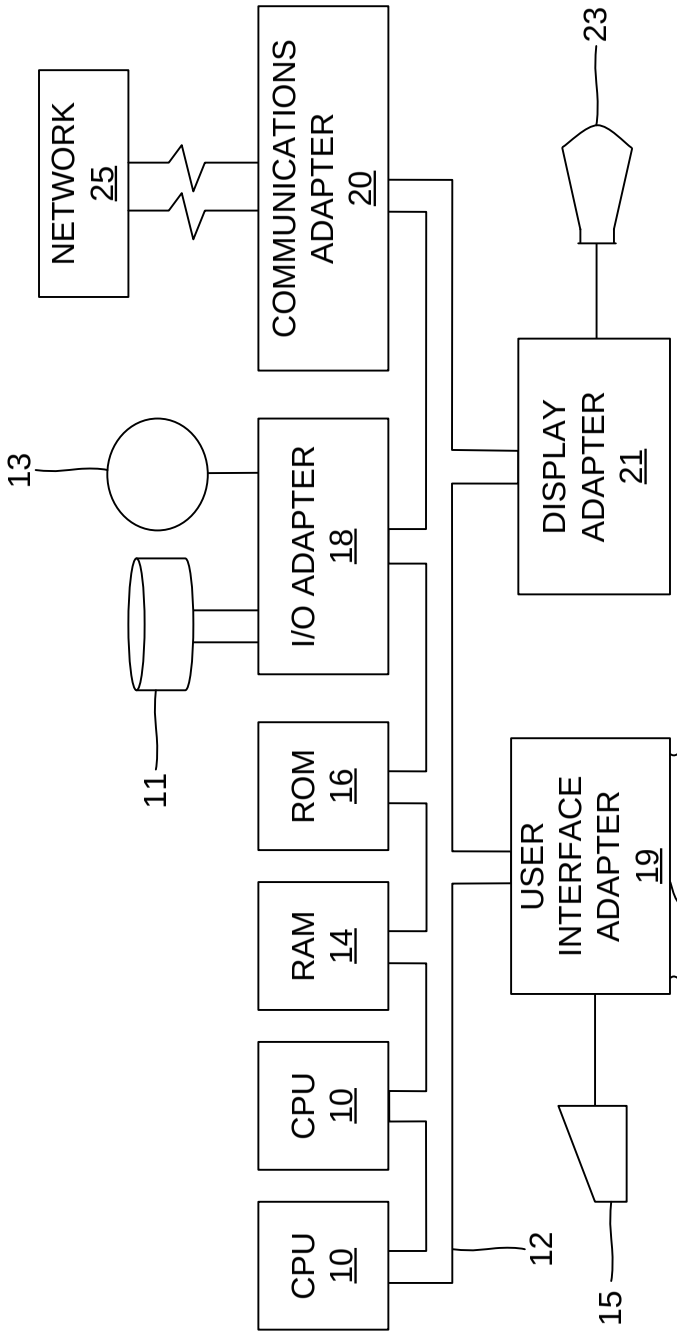

FIG. 8

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Replacement sheets of claims
Application number: 201741046522

CLAIMS

I/We claim:

1. A system for evaluating and managing traffic congestion, using a traffic management server (104) on at least one-lane road that enables providing signals in real-time to a plurality of vehicle assistance modules (106A1-A3, 106B1-B3) associated to a plurality of vehicles (108A1-A3, 108B1-B3) using at least one sensor of a plurality of moving drones (102A, 102B) to reduce the traffic congestion, wherein the system comprises:

the plurality of moving drones (102A, 102B), capturing a media content of the at least one-lane road and transferring the media content to the traffic management server (104), wherein the at least one-lane road includes a first side of the at least one-lane road and a second side of the at least one-lane road; (***See support in Para [0039], Claim 3***)

the traffic management server (104), acquiring the media content of the at least one-lane road and the traffic management server (104) comprising: (***See support in Para [0039]***)

a storage device; and

a processor in communication with the storage device, wherein the processor executes machine-readable instructions to perform;

receiving the media content of an area between a first point and a second point of the at least one-lane road, wherein the media content is captured using the plurality of moving drones (102A, 102B);

characterized in that,

transforming the media content to machine-readable media content;

processing the machine-readable media content, wherein said processing comprising:

generating a database of the plurality of vehicles (108A1-A3, 108B1-B3) present in the area between the first point and the second point of the at least one-lane road and tagging the plurality of vehicles

(108A1-A3, 108B1-B3) as per the position of the plurality of vehicles (108A1-A3, 108B1-B3);

computing a speed of each of the plurality of vehicles (108A1-A3, 108B1-B3) from a first position of a vehicle from the media content captured at a first instance and a second position of the vehicle from the media content captured at a second instance;

classifying the plurality of vehicles (108A1-A3, 108B1-B3) whose computed speed is more than a threshold speed into a first set of vehicles and the plurality of vehicles (108A1-A3, 108B1-B3) whose computed speed is slower than the threshold speed into a second set of vehicles;

predicting a position of each of the plurality of vehicles (108A1-A3, 108B1-B3) based on the computed speed;

identifying gaps between the predicted position of each of the plurality of vehicles (108A1-A3, 108B1-B3) and a current position of each of the plurality of vehicles (108A1-A3, 108B1-B3);

determining a set of gaps that exceed a threshold distance from the identified gaps between the first set of the vehicles and the second set of vehicles;

computing a length of each gap of the set of gaps between the first set of vehicles and the second set of vehicles; and

identifying a vehicle crossing the threshold distance of the gap from the first set of vehicles and the second set of vehicles, wherein the threshold distance of the gap is greater than the length of each gap of the set of gaps; ***(See support in Para [0040], Claim 6)***

generating recommendation comprising a speed suggestion to the identified vehicles to maintain the gap between the first set of vehicles and the second set of vehicles; and

providing, by the plurality of moving drones (102A, 102B), recommendations as signals in real-time to each of the plurality of vehicle assistance modules (106A1-A3, 106B1-B3) associated to the plurality of vehicles (108A1-A3, 108B1-B3) using the at least one sensor of the plurality of moving drones (102A, 102B) to reduce the traffic congestion (i) for overtaking when the gap is more than a threshold gap and an overtaking time is less than an expected crossing time or (ii) stop or slow down when the gap for overtaking is less than a threshold gap and the overtaking time is more than an expected crossing time in ~~a~~ the at least one-lane road. ***(See support in Para [0045], Claim 6)***

2. The system as claimed in claim 1, wherein the processor executes machine-readable instructions for performing:

determining the vehicle that has followed the recommendations; and

updating the database (402) with vehicle information comprising a position and a speed of the vehicle.

3. The system as claimed in claim 1, wherein the system comprises:

a control unit that

receives an input of information of the road, and the position of each vehicle on the at least lane one road, wherein the at least lane one road is straight or curved road, wherein the input is communicated by (a) the plurality of moving drones (102A, 102B) that captures a vehicular traffic information from the at least one-lane road using the at least one sensor or at least one camera or (b) the plurality of vehicle

assistance modules (106A1-A3, 106B1-B3) that is incorporated in a communication device of each of the plurality of the vehicles (108A1-A3, 108B1-B3);

determines a number of vehicles on a length of the at least one lane road; and

captures and communicates relative positions of the plurality of vehicles (108A1-A3, 108B1-B3) to the traffic management server (104).

4. The system as claimed in claim 1, wherein the processor executes machine-readable instructions for performing:

generating a multi agent simulation to visualize the traffic information comprising the position of the plurality of vehicles (108A1-A3, 108B1-B3) ahead of time; and

identifying the gaps for the vehicle to overtake in real time.

5. The system as claimed in claim 1, wherein the processor executes machine-readable instructions for performing:

identifying the traffic congestion when the plurality of vehicles (108A1-A3, 108B1-B3) moves at the speed less than a predetermined threshold speed for more than a predetermined duration at a traffic information analysis module (406);

identifying points and vehicles at the points using the traffic information analysis module (406) of said system; and

generating commands at a command generation module (410) to the plurality of vehicles (108A1-A3, 108B1-B3) to increase or decrease the speed or to overtake a vehicle that is running in front.

6. The system as claimed in claim 1, wherein the plurality of moving drones (102A, 102B) captures data comprising:

(a) a number of vehicles on the road;

(b) a position of each vehicle on the road;

(c) a condition of the road with respect to the position of the vehicle, and communicates the data to the control unit and receives an instruction from the control unit to display traffic signal to an optimal speed for visibility to the drivers of the vehicles.

7. The system as claimed in claim 1, wherein the traffic management server (104) issues a speed recommendation to the vehicle on the first side of the road and after the recommendation is accepted, adds the vehicle to either the first set of vehicles or the second set of vehicles.

8. A method for evaluating and managing traffic congestion, using a traffic management server (104) on at least one-lane road that enables providing signals in real-time to a plurality of vehicle assistance modules (106A1-A3, 106B1-B3) associated to a plurality of vehicles (108A1-A3, 108B1-B3) using at least one sensor of a plurality of moving drones (102A, 102B) to reduce the traffic congestion, said method comprising:

receiving the media content of an area between a first point and a second point of the at least one-lane road, wherein the media content is captured using the plurality of moving drones (102A, 102B);

characterized in that,

transforming the media content to machine-readable media content;

processing the machine-readable media content, wherein said processing comprising:

generating a database of the plurality of vehicles (108A1-A3, 108B1-B3) present in the area between the first point and the second point of the at least one-lane road and tagging the plurality of vehicles (108A1-A3, 108B1-B3) as per the position of the plurality of vehicles (108A1-A3, 108B1-B3);

computing a speed of each of the plurality of vehicles (108A1-A3, 108B1-B3) from a first position of a vehicle from the media content captured at a first instance and a second position of the vehicle from the media content captured at a second instance;

classifying the plurality of vehicles (108A1-A3, 108B1-B3) whose computed speed is more than a threshold speed into a first set of vehicles and the plurality of vehicles (108A1-A3, 108B1-B3) whose computed speed is slower than the threshold speed into a second set of vehicles;

predicting a position of each of the plurality of vehicles (108A1-A3, 108B1-B3) based on the computed speed;

identifying gaps between the predicted position of each of the plurality of vehicles (108A1-A3, 108B1-B3) and a current position of each of the plurality of vehicles (108A1-A3, 108B1-B3);

determining a set of gaps that exceed a threshold distance from the identified gaps between the first set of the vehicles and the second set of vehicles;

computing a length of each gap of the set of gaps between the first set of vehicles and the second set of vehicles; and

identifying a vehicle crossing the threshold distance of the gap from the first set of vehicles and the second set of vehicles, wherein the threshold distance of the gap is greater than the length of each gap of the set of gaps;

generating recommendation comprising a speed suggestion to the identified vehicles to maintain the gap between the first set of vehicles and the second set of vehicles; and

providing, by the plurality of moving drones (102A, 102B), recommendations as signals in real-time to each of the plurality of vehicle assistance modules (106A1-

A3, 106B1-B3) associated to the plurality of vehicles (108A1-A3, 108B1-B3) using the at least one sensor of the plurality of moving drones (102A, 102B) to reduce the traffic congestion (i) for overtaking when the gap is more than a threshold gap and an overtaking time is less than an expected crossing time or (ii) stop or slow down when the gap for overtaking is less than a threshold gap and the overtaking time is more than an expected crossing time in ~~a~~ the at least one-lane road.

9. The method as claimed in claim 8, wherein the method comprises the steps of:

identifying the traffic congestion when the plurality of vehicles (108A1-A3, 108B1-B3) moves at the speed less than a predetermined threshold speed for more than a predetermined duration;

identifying points and vehicles at the points on the second side of the at least one lane road;

generating commands to the plurality of vehicles (108A1-A3, 108B1-B3) at the points on the second side of the at least one lane road to increase or decrease the speed or to overtake the vehicle that is running in front.

Signature of the patent Agent:
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