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TITLE OF THE INVENTION

MULTI SENSOR VEHICLE POSITIONING SYSTEM EMPLOYING SHARED DATA PROTOCOL

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MULTI SENSOR VEHICLE POSITIONING SYSTEM EMPLOYING SHARED DATA PROTOCOL

Technical Field

[0001] The embodiments herein generally relate to a method for multi sensor vehicle positioning system employing shared data protocol.

Description of the Related Art

[0002] A routing database was required in the prior art to support all possible options and specifications for the number of connections between controllers. It is necessary to update the routing database if the vehicle has more options or if the electronics have more features. Typically, automobiles use a gateway inside the vehicle to convert protocols between diverse networks in order to collect data for transmission to the ECU. Advanced vehicle dynamics control systems frequently make use of sensed vehicle dynamics data like roll angle, pitch angle, yaw rate, roll rate, pitch rate, lateral and longitudinal speeds, lateral and longitudinal acceleration, tire slip rate, and other sensed vehicle parameters. These systems include active suspension control systems, traction control systems, and brake control systems. These navigation systems employ the satellite signals that are received to determine the driver's location and direct them along the path to their destination that has been predetermined by the digital map. A satellite-based navigation system installed in the cab uses its location to establish the vehicle's position, which is then adjusted in accordance with a correction value reflecting the relative movement between the cab and the chassis. Additionally, Profibus supports the polling technique, in which the master polls all slaves, i.e., the aforementioned peripheral modules, and either receives data from or writes it into the peripheral modules.

[0003] The gateway searches a routing database for all the controllers to retrieve routing information, and using the results, it constructs the message transmission path between two particular controllers. Each electronic component in the vehicle needs to have an Internet protocol (IP) address if Ethernet is to be used as the network. Both a static IP address assignment method and a dynamic IP address assignment method are common ways to assign IP addresses. A car with a GPS or aided GPS may not be able to precisely pinpoint its location in particularly crowded urban areas or in structures like parking lots due to a lack of GPS signals. The top cross connection of the A pillars in front of the windscreen is where the camera system discussed here is installed. Based on the signals or information from the acceleration sensor or the inertial sensor paired with the GNSS information, a very accurate localization or positioning can be carried out. The input and output modules known as peripheral modules are those from which the system bus master can read data or from which it can receive data.

[0004] Data can be sent and received by electronic equipment inside vehicles over a vehicle communication network. Due to the recent use of many alternatives, the complexity of the communication networks and electric components installed in vehicles has been rising. Dynamic IP address assignment increases network flexibility, but at the cost of a longer wait time on the network. Upon starting the vehicle, all electronics should operate normally. The vehicle navigation system, however, may receive insufficient GPS signals when a driver uses it for directions. Using a global navigation system, a vehicle's location can be determined by using at least one receiving device for receiving position and time signals, and a location calculating module that calculates the location information based on the position and time data received. That is, the inertial sensor or acceleration sensor signal located in or on the navigation device, as well as the signal of the inertial sensor or acceleration sensor located on the vehicle's

chassis, are used to determine the correction value. There are currently systems (such as PROFINET) that employ planning to prevent Ethernet collisions, however this results in the users being limited in their ability to submit spontaneous communication requests, such as alarms, at certain times.

SUMMARY

[0005] In view of the foregoing, an embodiment herein provides a method for multi sensor vehicle positioning system employing shared data protocol. A feature of the current disclosure is the provision of a message routing system and a method for it that can convert a CAN message into a service message for service-oriented communication and set a CAN message transmission path between controllers using information in the service message without having to search through a routing database that stores all the message transmission paths between a variety of controllers. A system and a method for controlling it that can dynamically assign an IP address when the message to be sent or received in at least one device changes while several devices are being used. A stability control system that is equipped to provide stability control data; a compass that is configured to offer compass data. The technique according to the invention is further simplified and expedited by using a common electronic calculation module to implement both location calculation algorithms and picture processing algorithms, as all information is processed by the same electronic calculation unit. The processing unit learns from the signaling sequence that a message is available from a certain peripheral module and has to be fetched by the processing unit.

[0006] In some embodiments, wherein by comparing the first service ID and the second service ID, the gateway can identify the service data that needs to be transferred to the second controller, create a service data message that contains the service data, and send the service

data message to the adapter. When the vehicle communication network is started, the communicator's controller can decide whether a message that needs to be transmitted to at least one device has changed. If it hasn't, it can send a no-change flag to a group of devices based on a table, and if it hasn't, it can send a message to each of the group of devices based on the table when it receives the no-change flag from the group of devices. The last known vehicle position, the compass heading from the compass, and stability control data from the stability control system are used to determine the current vehicle position, with the compass heading being adjusted in accordance with the forwards acceleration and grade identified from the stability control data. To enhance picture processing, information about the distance the vehicle travelled between the two image capture processes is used. This is made up of the signaling sequence's pure transmission time and any potential latency time if a maximum-length telegram needs to be transmitted first.

[0007] In some embodiments, wherein as part of the method, the service data message may be transmitted to the adapter; and the service data message may be converted into a CAN message, which can be transmitted to the second controller. The vehicle may contain: a plurality of devices in a vehicle communication network, each of which includes: a communicator that can communicate with other devices, memory that stores the destination IP address list and the reception message list; and a controller that allows a message to be transmitted to the at least one other device based on the destination IP address table and the message identification information. The method further involves estimating the vehicle's position based on steering sensor data and a heading estimate. Position and time signals are processed using the processed image information to determine the prevailing reception conditions, in particular matching the processing to the prevailing reception conditions. If

signaling sequences with the same priority are present, the priority stage can forward a signaling sequence that is determined by a priority scheme that is applicable on the system bus, avoiding any conflicts.

[0008] 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

[0009] The embodiments herein will be better understood from the following detailed description with reference to the drawings, in which:

[0010] FIG. 1 illustrates a method for multi sensor vehicle positioning system employing shared data protocol according to an embodiment herein; and

[0011] FIG. 2 illustrates a method for a configuration of a message routing system according to an embodiment herein.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0012] 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.

[0013] FIG. 1 illustrates a method for multi sensor vehicle positioning system employing shared data protocol according to an embodiment herein. The sensor may include a speed sensor to measure speed, an acceleration sensor to measure acceleration of the vehicle, a yaw rate sensor to measure rotational angular speed of the vehicle, a gyro sensor to measure vehicle inclination, a steering angle sensor to measure rotation and steering angle of the steering wheel, a temperature sensor to measure internal and external vehicle temperatures, an illuminance sensor to measure illumination, and more. In order for the programmed instructions to be stored and executed in a distributed manner, such as by a telematics server or a Controller Area Network (CAN), the computer readable recording medium can also be dispersed over a computer network. GPS or GPS data may be used by automobile navigation systems to determine the present location of the vehicle. However, the car may employ a variety of non-GPS sensor inputs to track the vehicle if GPS data is either unavailable or extremely unreliable. Images and position data may be transmitted via the vehicle data bus, making the data accessible to the car's systems and auxiliary equipment.

[0014] In some embodiments, the body control system may comprise an airbag control device for the driver's safety in the event of a collision, an electronic stability control (ESC) to control the vehicle's attitude during acceleration or cornering, a lane keeping assist system to help the driver leave the driving lane, lane following assistance, and the like. The light is

positioned on the outside of the vehicle body and designed to perform signal and communication tasks with other vehicles and pedestrians while allowing the user to quickly recognize information about the surroundings while looking forwards. When parked, the car may also preserve information about GPS availability status for instance, when no GPS signals are received while parked in a parking lot, making it possible to determine more quickly, upon restarting the vehicle, whether a different approach to determining the location of the vehicle is required. Therefore, the location determination device makes the assumption that the available position and time signals have drastically worsened or vanished by the time it reaches tunnel.

[0015] In some embodiments, the CAN messages are generally composed of a CAN ID which contains service information provided by the controller, but do not contain address information of a source or destination. The controllers of each device may consist of load controllers that control the operation of the load, and their memory may consist of programs that control the operation of the load. To facilitate communication over a communication network, the in-vehicle modem can be associated with a unique device identification code to identify communication over a communication network. A receiver receives position and time signals from multiple satellites associated with the global navigation system. The fundamental goal of the innovation is to make it possible for a message to be delivered to the processing unit from peripheral modules without relying on telegraph traffic started by the processing unit.

[0016] FIG. 2 illustrates a method for a configuration of a message routing system according to an embodiment herein. In some embodiments, the prior art, the gateway broadcasts the CAN message it has received to all of the CAN channels and chooses the message transmission method based on whether it has also received a response message. The

third controller controls information such as a tachometer, a speedometer, a coolant temperature indicator, and a fuel indicator to be displayed in a dial manner based on detection information, which is detected by the at least one detector, and the third controller controls turning on and off a turn signal indicator, a high beam indicator light, various warning lights, and a transmission selector lever indicator. The GPS availability flag, which indicates whether GPS is available, may also be set by the location determination application and stored in the memory, for example. The technique, bus protocol, peripheral module, processing unit, hub, and system composed of said components for event signaling between at least one peripheral module and a processing unit over a system bus are all included in the invention.

[0017] An algorithm or programmed for message routing may be stored in memory 11. Message routing may be carried out by the processor utilizing algorithms and/or programmed kept in the memory. Each device may connect to at least one other device, which performs at least one function, through the communicator and carry out a mutual communication by utilizing the same message. The location determination application may be set up to use data other than the GPS data when GPS isn't available in order to ascertain the present location of the vehicle. When the signaling sequences are transmitted to a neighboring module, this information is sent to the hold stage for consideration along with the priority stage own potential alarm messages 14–16.

[0018] The service-oriented communication method differs from the static CAN communication in that it is dynamic. Data is exchanged between multiple controllers through service discovery and data access as part of the service-oriented communication. If a message is damaged, a communicator of one device identifies it, and if it is damaged, the communicator determines whether the communication networks of the two other devices are occupied, and

then transmits the message after the communicator has been ready for a predetermined period of time. Location determination application may use the current vehicle location as the new last known location if the current vehicle location is verified. It is at this point that process comes to an end after operation.

CLAIMS

I/We Claim:

1. A method for multi sensor vehicle positioning system employing shared data protocol, wherein the method comprises;

consisting an adapter set up to convert between a service message for service-oriented communication and a Controller Area Network (CAN) message for CAN communication;

employing a network architecture with a physical layer, a data link layer, a network layer, and an application layer, a communicator set up to provide a vehicle communication network;

based on the consistency of the plurality of estimates with regard to one another, selecting the subset of the plurality of estimates of the current position that is most reliable;

receiving apparatus (102) for receiving signals indicating position and time from a number of satellites linked to a global positioning system; and

utilizing a system bus master to control the system bus, where the system bus master either reads data from or sends data to the at least one peripheral module.

Dated this, 17th August, 2023.

Signature

ABSTRACT

MULTI SENSOR VEHICLE POSITIONING SYSTEM EMPLOYING

SHARED DATA PROTOCOL

As an embodiment illustrates, a message routing system that enables service-oriented communication without the need to query a routing database that contains all message transmission paths between multiple controllers is designed to perform message routing utilizing service-oriented communication: an adapter that converts between CAN (Controller Area Network) messages for CAN communication and service messages for service-oriented communication. In addition, in response to a control signal sent by the controller, the memory may be set up to modify the destination IP address in relation to the identification information of the least one message stored in the table. The precision of vehicle positioning is the subject of the current system. When satellite positioning data from a satellite-based positioning system module is not available, a controller may save a last known vehicle location and estimate a current vehicle position from the last known vehicle position using compass data and stability control data.

FIG.1