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(54) **SYSTEM AND METHOD FOR AUTOMATIC INFORMATION EXCHANGE BETWEEN VEHICLES INVOLVED IN A COLLISION**

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(52) **U.S. Cl.** **340/436**; 180/272; 235/384; 340/438

(58) **Field of Search** 340/436, 438, 340/961, 825.69, 825.72, 425.5, 901, 902, 905; 280/735; 180/272; 342/457; 235/384; 701/117

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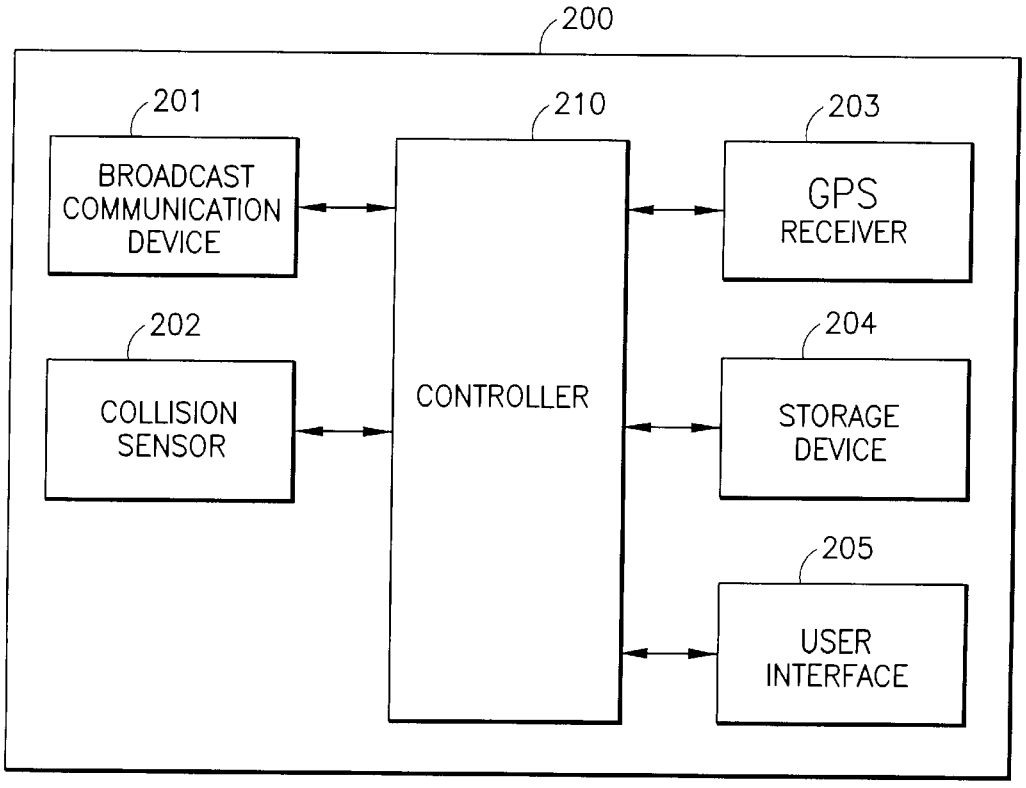
(57) **ABSTRACT**

A method for exchanging information between vehicles involved in or near a collision site. When a collision is sensed by one vehicle, a message is transmitted from the one vehicle to at least one of the other vehicles within a threshold distance of the one vehicle. The message contains at least the identity of the one vehicle and preferably driver information, insurance information, along with the time and place of the collision.

18 Claims, 3 Drawing Sheets



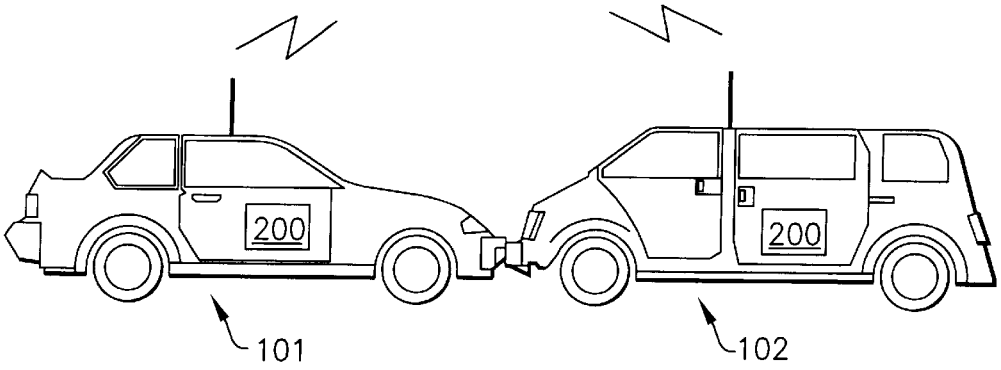


FIG. 1

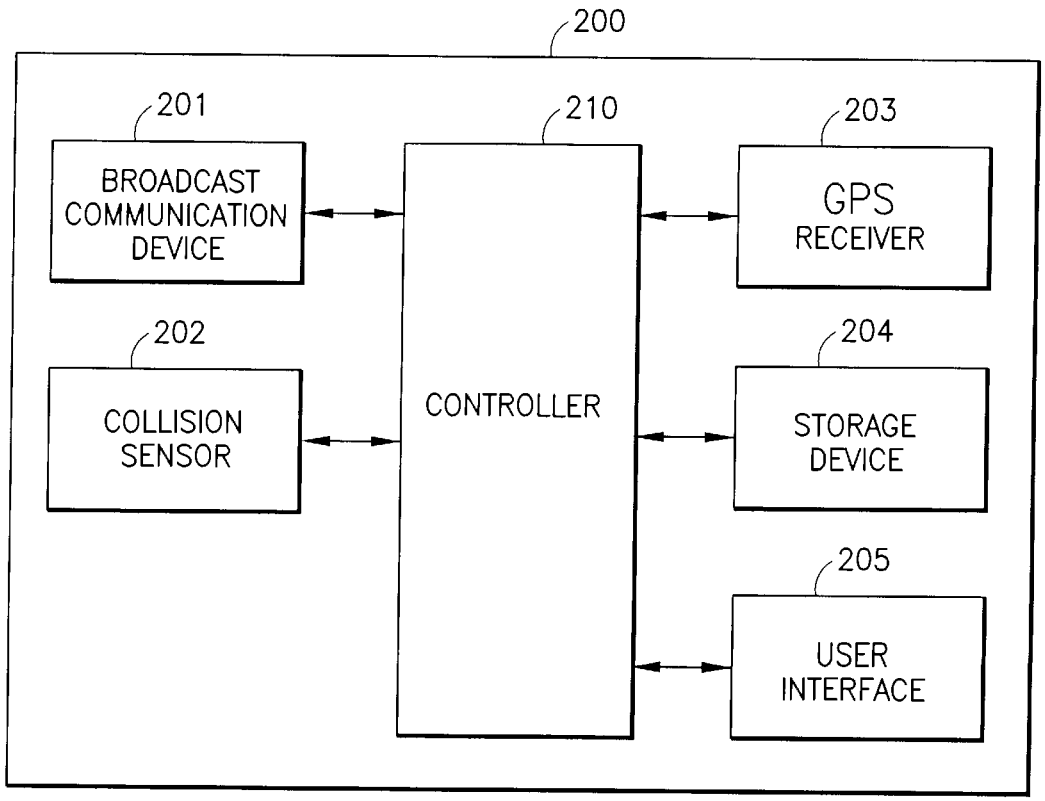


FIG. 2

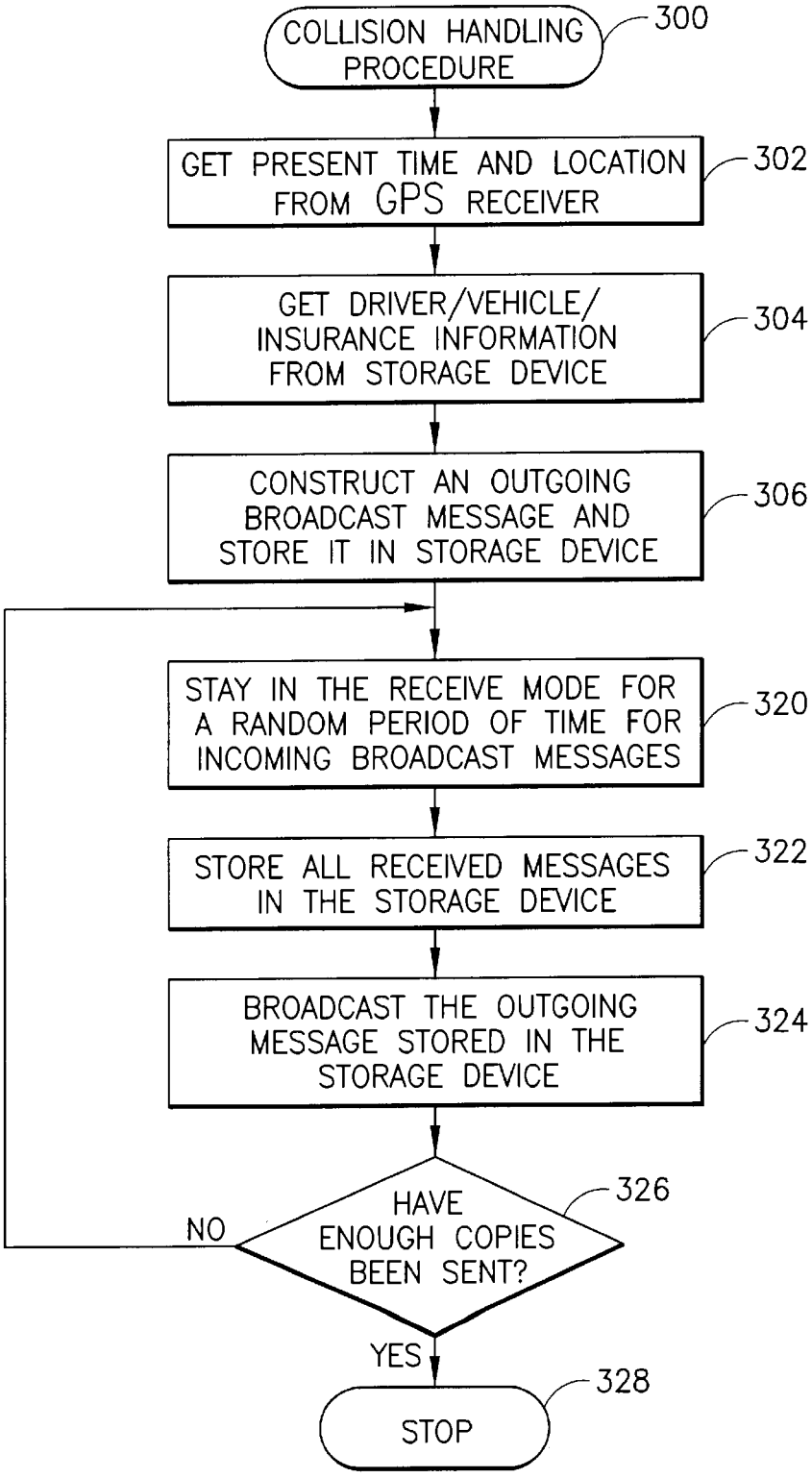


FIG.3

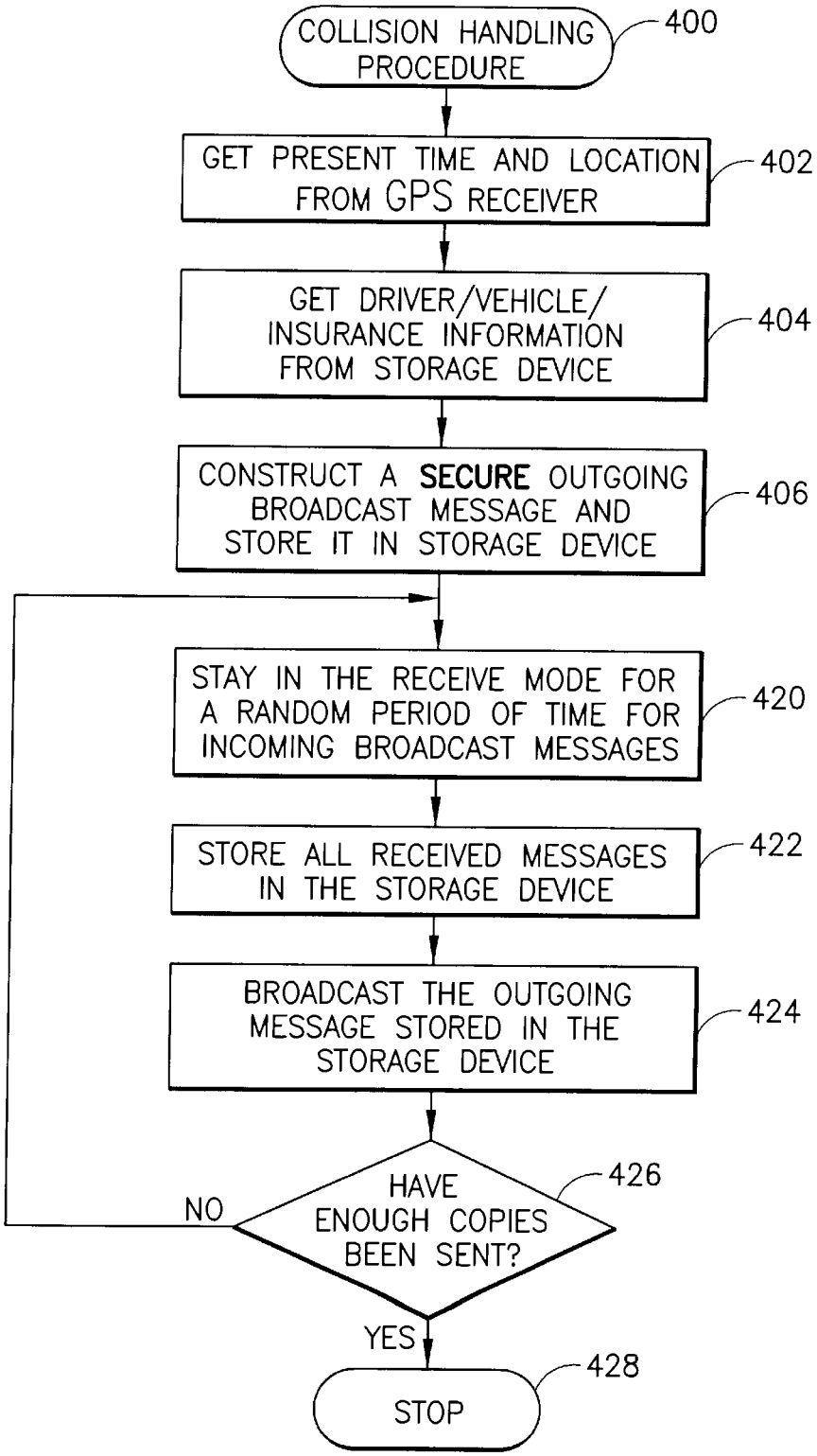


FIG.4

SYSTEM AND METHOD FOR AUTOMATIC INFORMATION EXCHANGE BETWEEN VEHICLES INVOLVED IN A COLLISION

DESCRIPTION

Field of the Invention

This invention relates to mobile wireless communication, and more specifically to a method for automatically exchanging information between vehicles involved in a collision or near a collision site.

BACKGROUND OF THE INVENTION

The current law requires drivers involved in a collision exchange insurance information and get witness if possible. Typically this is done by paper and pen, which is both time consuming and error prone. Sometimes drivers may not have their insurance information available at the scene of incidents. Sometimes drivers may even try to escape from the scene to avoid liability.

Collision detection and automatic notification systems already exist in the prior art, for example OnStar from General Motor [1], MP200-GPS from Sierra Wireless [2], and Placer 450 from Trimble [3]. These systems deliver notification to a central station with a preprogrammed number stored in the in-vehicle device via vehicle-to-infrastructure communications. The problem with these solutions is that they do not allow vehicles to exchange information and that they require vehicles in the communication range of cellular network infrastructure.

BRIEF SUMMARY OF THE INVENTION

This present invention discloses a method which can automatically collect the other party's information and find witness at the scene of incidents without human intervention, thus greatly reducing the possibility of transcription error and hit-and-run.

This invention requires an automobile to be equipped a device of the following characteristics. First, the device needs wireless communication capability which can transmit/receive packets to/from the air. Second, the device needs some storage capability which can store the driver's information (e.g. name and driver license number), the vehicle's information (e.g., vehicle identification number and license plate number) and the driver's insurance information (e.g., insurance company name, policy number, and phone number.) Third, the device needs a sensor which can determine whether or not the vehicle is involved in a collision.

The basic sequence of events that will happen in a incident involving two vehicles equipped with the aforementioned device is described as follows. The sequence of events for the case of a multi-vehicle incident can be derived easily. Upon the collision sensors in both vehicles detect a collision, the in-vehicle device will broadcast its information over a radio channel and also try to receive the information from the other party.

The information to be exchanged can be tagged with the time and location when a collision is detected so that exchanging information are confined within vehicles involved in the same collision. The time and location information can be obtained, for example, by Global Position Systems (GPS).

In order to be sure that the information received is truly originated from the sender, the message sender has to digitally sign the message using a cryptosystem known in the prior art. Digital signatures can also prevent the receiving party from tampering with the received information. The broadcast information can also be encrypted by the public key of a trusted third party such as the police department or DMV (department of motor vehicles). In such a case, the receiving party has to work with the trusted third party to decrypt the received information.

The nature, principle and utility of the invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a collision involving two vehicles which exploit the present invention to automatically exchange information.

FIG. **2** is a block diagram showing the functional modules of the in-vehicle device according to the present invention.

FIG. **3** is a flowchart for the collision handling procedure executed by the controller when the collision sensor is triggered.

FIG. **4** is a flowchart for the alternative collision handling procedure executed by the controller when the collision sensor is triggered.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Preferred embodiment of this invention will be described with reference to the accompanying drawings.

FIG. **1** shows a collision involving two vehicles **101** and **102** which exploit the present invention **200** to automatically exchange information.

FIG. **2** is a block diagram showing the functional modules of the in-vehicle device **200** in FIG. **1**. The in-vehicle device **200** includes a controller **210** which is connected to a broadcast communication device **201**, a collision sensor **202**, a GPS (Global Positioning System) receiver **203**, a storage device **204** and an input/output (I/O) device **205**. The controller **210** can send and receive messages over a broadcast channel using the broadcast communication device **201**. For the cost reasons, the broadcast communication device **201** is half-duplex, which means that the device can transmit and receive but not simultaneously. The collision sensor **202** can monitor the activity of the vehicle and notify the controller **210** when it detects that the vehicle is involved in a collision. The GPS receiver **203** can provide the controller **210** with the location of the vehicle in terms of longitude/latitude/altitude coordinates within the accuracy of the GPS system. The storage device **204** stores the information about the driver, the vehicle, the insurance company, and the messages sent and received by the controller **210**. The user interface **205** is for the driver or other persons to interact with the in-vehicle device and to access the information stored in the storage device **204**.

The in-vehicle device can be implemented by two embodiments. Which one is preferable depends on whether the in-vehicle device has to perform tasks other than the ones being described, i.e. automatic information exchange upon collision.

In the case where the user interface **205** is a microphone, the controller **210** of the in-vehicle device is a PC with sufficiently high processing power such that it can perform tasks such as speech recognition, text-to-speech conversion, audio equipment control, internet access, etc. An example is

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