**Title:** VEHICLE STOP WARNING SYSTEM

A system for automatically calling the drivers attention to the upcoming need to bring his vehicle to a stop, which includes a transmitter (12) located at a fixed location along the roadway in the vicinity of the area where the vehicle is to come to a stop. The transmitter (12) transmits signals directed at oncoming vehicles. The system further includes a receiver (14) connected to an incoming vehicle for receiving the above signals. Finally, the system includes a mechanism (16) for outputting a warning message to the driver which is related to the signals received by the receiver (14).
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VEHICLE STOP WARNING SYSTEM

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to systems which can be used to provide a driver with information from the outside of the car, for example, as to the need to bring the car to a stop and, more particularly, to automatic systems for alerting drivers of the imminent need to bring their vehicles to a stop, for example at a stop sign, a red stop light or because of the presence of an emergency vehicle, such as an ambulance, or to warn the driver of hazards in the road, and the like.

A large number of accidents occur each year as a result of the failure of a car to stop at a stop light or at a red traffic light. While the failure to stop is, in a few cases, the result of a deliberate decision on the part of the driver to disregard the stop light or stop sign, in the vast majority of the cases, the failure to stop can be traced to a momentary lapse of attention on the part of the driver. In many cases, especially under difficult driving conditions, or when the driver is fatigued or otherwise distracted and preoccupied, the driver fails to perceive the traffic light or stop sign in time to bring the car to a stop.

There is thus a widely recognized need for, and it would be highly advantageous to have, a system for automatically alerting a driver of upcoming hazards in the road, especially of stop lights and stop signs in particularly dangerous intersections.

SUMMARY OF THE INVENTION

According to the present invention there is provided a system for automatically calling the driver's attention to the upcoming need to bring his vehicle to a stop, comprising: (a) a transmitter located at a fixed location along the roadway in the vicinity of the area where the vehicle is to come to a stop, the transmitter transmitting signals directed at oncoming
vehicles; (b) a receiver connected to an oncoming vehicle for receiving the signals; and (c) output means for outputting a warning message to the driver which is related to the received signals.

According to further features in preferred embodiments of the invention described below, the signals can be any suitable signals, including, but not limited to, various electromagnetic radiation signals.

According to still further features in the described preferred embodiments, the warning message can include sound, light and/or vibration.

According to another embodiment of the present invention, there is provided a system for automatically calling the driver's attention to an upcoming hazardous situation, comprising: (a) a transmitter located at a fixed location along the roadway, the transmitter transmitting signals directed at oncoming vehicles, the transmitted signals being related to the hazardous situation; (b) a receiver connected to an oncoming vehicle for receiving the signals; and (c) output means for outputting a warning message to the driver which is related to the received signals.

According to yet another embodiment of the present invention, there is provided a system for preventing a driver from falling asleep at the wheel of his vehicle during driving on long stretches of road, comprising: (a) a plurality of transmitters located at various intervals along the roadway, the transmitters transmitting signals directed at oncoming vehicles; (b) a receiver connected to an oncoming vehicle for receiving the signals; and (c) output means for outputting a warning message to the driver which is related to the received signals.

According to yet another embodiment of the present invention, there is provided a system for alerting all traffic in the vicinity of an intersection of the need to stop so as to allow an emergency vehicle pass safely through the intersection, comprising: (a) a transmitter connected to the emergency vehicle, the transmitter transmitting signals directed to all vehicles in the
vicinity of the intersection; (b) a receiver connected to the vehicle in the vicinity of the intersection for receiving the signals; and (c) output means for outputting a warning message to the drivers which is related to the received signals.

According to still another embodiment of the present invention, there is provided a system for alerting all traffic in the vicinity of an intersection of the need to stop so as to allow an emergency vehicle pass safely through the intersection, comprising: (a) a stationary transmitter located near the intersection, the stationary transmitter, when activated, transmitting primary signals directed to all vehicles in the vicinity of the intersection; (b) a stationary receiver located near the stationary transmitter, the stationary receiver, when activation signals are received, causing the activation of the stationary transmitter; (c) a mobile transmitter connected to the emergency vehicle, the transmitter transmitting activation signals directed to the stationary receiver; (d) a mobile receiver connected to the vehicle for receiving the primary signals; and (e) output means for outputting a warning message to the drivers which is related to the received primary signals.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

FIG. 1 is a depiction of a basic embodiment of the present invention as used in conjunction with a traffic light;

FIG. 2 shows a system as in Figure 1 but used to warn of upcoming dangerous curves;

FIG. 3 depicts an embodiment for periodically stimulating a driver so as to keep him alert during long drives over monotonous roads;

FIG. 4 depicts one system for handling warnings of an approaching emergency vehicle;
FIG. 5 depicts another system for handling warnings of an approaching emergency vehicle;

FIG. 6 shows another embodiment of a system as in Figure 1 with the transmitted signals oriented perpendicular to the roadway;

FIG. 7 shows another embodiment of a system as in Figure 1 with the addition of a display to indicate the failure of the car to come to a stop.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is of systems which can be used to automatically capture the attention of a driver so as to alert him of upcoming hazards in the road, including, but not limited to, an upcoming stop sign or red traffic light.

The principles and operations of systems according to the present invention may be better understood with reference to the figures and accompanying discussion.

Referring now to the drawings, Figure 1 shows a basic embodiment of the present invention. Here, a system is provided for automatically calling the driver's attention to the upcoming need to bring his vehicle to a stop, for example, a red traffic light 10, a stop sign, a raised bridge, a crossing train, and the like. The system includes at least three components -- a transmitter 12, a receiver 14 and an output means 16.

The transmitter is preferably located at a fixed location along the roadway, preferably in the vicinity of, and somewhat before, the area where the vehicle is to come to a stop. Most preferably, the transmitter is fixed to the traffic light (as in Figure 1), stop sign, and the like. The transmitter may be powered by any suitable energy source, including, but not limited to a battery or a solar panel. When affixed to a traffic light or similar object, the transmitter is preferably powered from the same electrical energy source as the traffic light, and the like.
The transmitter may transmit signals continuously, as in the case of a stop sign. A transmitter associated with a traffic light or a railroad crossing will transmit only intermittently, that is, only when the traffic light is red, or is about to turn red, and only when a train is crossing or about to cross.

The transmitter strength and orientation is such that only vehicles which approach from a specific direction and which are within a certain pre-determined distance from the transmitter will receive the signals. In this way, the information will be directed only to those drivers for which it is intended and will not be received by others.

The transmitted signals may be of any suitable type, including, but not limited to, various electromagnetic radiation signals, such as, for example, radio waves, microwaves, visible light or infrared. The frequency and/or intensity of the signals can be varied or modulated so as to transmit additional information beyond the existence of the need to bring the vehicle to a stop, for example, to identify that the upcoming need to stop is related to a railroad crossing, or, as described in more detail below, upcoming hazardous curves in the road (as in Figure 2).

Each vehicle which is to take advantage of a system according to the present invention includes a receiver which is capable of receiving the signals transmitted by the various transmitters. Also included in each vehicle is a suitable output means, connected to the receiver, for outputting a warning message which is related to the received signals. The message may include sounds, such as beeps or buzzing or a recorded voice message. Alternatively, or additionally, the message may include lights, e.g., blinking lights of various frequencies and/or lights of various colors.

Additionally or alternatively, the message may be transmitted through vibrations, for example, vibrations of the driver's seat. Preferably, the intensity, frequency, color or content of the various messages are related to the transmitted signals, so as to provide the driver with additional
information as to the situation ahead, for example, the type of hazard and its approximate distance from the vehicle.

A system according to the present invention can also be used to keep a driver alert during long stretches of driving on straight and monotonous roads. Such a system, depicted schematically in Figure 3, would include a number of transmitters located at suitable intervals along the roadway. The transmitters would continuously transmit signals directed at oncoming vehicles. When an oncoming vehicle is within the range of a particular transmitter, the signals are received by the receiver the associated output means outputs a suitable message to the driver which is calculated to slightly startle the driver and prevent him from going to sleep at the wheel of the vehicle.

In a somewhat modified embodiment, shown in Figure 4, of the present invention, emergency vehicles, such as ambulances, police cars and fire trucks are equipped with a transmitter similar to the stationary transmitter which is found connected to traffic lights and traffic signs in the above-described embodiments of the present invention. Unlike the stationary transmitter, the mobile transmitter is not limited to transmission in a small angle but is rather able to transmit through a much larger angle, say, 180°. In this way, as the vehicle approaches an intersection, the mobile transmitter is activated, sending signals throughout the upcoming intersection.

Receivers in vehicles approaching the intersection from all directions are able to pick up the signals and the outputting means produce messages which are preferably identifiable as emanating from an emergency vehicle. In this way, vehicles approaching the intersection are alerted to bring their vehicles to a stop and not proceed into the intersection.

In an alternative embodiment according to the present invention designed to accommodate the safe passage of emergency vehicles through intersections, a stationary receiver is located in the vicinity of the stationary
transmitter near the intersection (Figure 5). When activated, the stationary transmitter, transmits primary signals directed to all vehicles in the vicinity of the intersection. The stationary receiver is activated by activation signals transmitted by a mobile transmitter 18 connected to the emergency vehicle.

According to yet another embodiment according to the present invention, depicted in Figure 6, the transmitter, which is located a suitable distance before an upcoming obstacle or intersection, is aimed substantially transversely to the roadway. When a car reaches the location of the transmitter, the receiver senses the radiation and activates the output means. An advantage of such a system is that, through proper selection of the transmission angle of the radiation and possibly with the addition of a signal barrier (not shown) across the roadway from the transmitter, it is possible to design the system so that signals are only received by cars passing by the transmitter on the roadway and not by other unintended recipients of stray signals.

According to yet another embodiment of the present invention, each car is further equipped with a display 20, preferably a visual display at the rear of the car, which is connected to the receiver. In the event that a stop sign or red traffic light is not honored, i.e., in case the car fails to come to a full stop, the display exhibits a suitable message for an appropriate time interval, for example, five minutes, following the incident which allows police or other law enforcement authorities to identify the car and take whatever steps are necessary under the appropriate laws.

While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications and other applications of the invention may be made.
WHAT IS CLAIMED IS:

1. A system for automatically calling the driver's attention to the upcoming need to bring his vehicle to a stop, comprising:
   (a) a transmitter located at a fixed location along the roadway in the vicinity of the area where the vehicle is to come to a stop, said transmitter transmitting signals directed at oncoming vehicles;
   (b) a receiver connected to an oncoming vehicle for receiving said signals; and
   (c) output means for outputting a warning message to the driver which is related to said received signals.

2. A system as in claim 1, wherein said signals are an electromagnetic radiation.

3. A system as in claim 2, wherein said signals are radio waves.

4. A system as in claim 2, wherein said signals are microwave.

5. A system as in claim 2, wherein said signals are visible light.

6. A system as in claim 2, wherein said signals are infrared.

7. A system as in claim 1, wherein said warning message includes sound.

8. A system as in claim 1, wherein said warning message includes light.
9. A system as in claim 1, wherein said warning message includes vibrations.

10. A system as in claim 9, wherein said vibrations vibrated the driver's seat.

11. A system as in claim 1, wherein said transmitted signals are transmitted in a narrow angle so as to avoid reception of said signals by vehicles which are not oncoming.

12. A system as in claim 1, wherein said warning message varies with the amplitude of said received signals.

13. A system as in claim 1, further comprising:
   (d) a second output means to display a message for a pre-determined time in the event that the vehicle is not brought to a stop.

14. A system for automatically calling the driver's attention to an upcoming hazardous situation, comprising:
   (a) a transmitter located at a fixed location along the roadway, said transmitter transmitting signals directed at oncoming vehicles, said transmitted signals being related to the hazardous situation;
   (b) a receiver connected to an oncoming vehicle for receiving said signals; and
   (c) output means for outputting a warning message to the driver which is related to said received signals.
15. A system for preventing a driver from falling asleep at the
crash of his vehicle during driving on long stretches of road, comprising:
(a) a plurality of transmitters located at various intervals along
the roadway, said transmitters transmitting signals directed at
oncoming vehicles;
(b) a receiver connected to an oncoming vehicle for receiving
said signals; and
(c) output means for outputting a warning message to the driver
which is related to said received signals.

16. A system for alerting all traffic in the vicinity of an
intersection of the need to stop so as to allow an emergency vehicle pass
safely through the intersection, comprising:
(a) a transmitter connected to the emergency vehicle, said
transmitter transmitting signals directed to all vehicles in the
vicinity of the intersection;
(b) a receiver connected to the vehicle in the vicinity of the
intersection for receiving said signals; and
(c) output means for outputting a warning message to the drivers
which is related to said received signals.

17. A system for alerting all traffic in the vicinity of an
intersection of the need to stop so as to allow an emergency vehicle pass
safely through the intersection, comprising:
(a) a stationary transmitter located near the intersection, said
stationary transmitter, when activated, transmitting primary
signals directed to all vehicles in the vicinity of the
intersection;
(b) a stationary receiver located near said stationary transmitter, said stationary receiver, when activation signals are received, causing the activation of said stationary transmitter;

(c) a mobile transmitter connected to the emergency vehicle, said transmitter transmitting activation signals directed to said stationary receiver;

(d) a mobile receiver connected to the vehicle for receiving said primary signals; and

(e) output means for outputting a warning message to the drivers which is related to said received primary signals.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC(5) : G08G 1/09; G08G 1/07
US CL : 340/905, 906, 902
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
U.S. : 340/905, 906, 902, 936

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>X</td>
<td>US, A, 3,775,743 (CARTER) 27 November 1973 (27.11.73), see abstract, col. 5, lines 21-67.</td>
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Further documents are listed in the continuation of Box C. [X] See patent family annex.

Date of the actual completion of the international search
28 OCTOBER 1994

Date of mailing of the international search report
09 JAN 1995

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks
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Washington, D.C. 20231
Facsimile No. (703) 305-3230

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<td>Y</td>
<td>US, A, 4,775,865 (SMITH et al.) 04 October 1988 (04.10.88), see abstract, figure 1.</td>
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