Title: AUTOMATIC VEHICLE HORN CONTROL SYSTEM AND METHOD

Abstract: An automatic vehicle horn control system includes a control unit (1), a horn (3) and a horn-operating-regulation acquisition means. An automatic vehicle horn control method includes the following steps: information about horn operating regulation related with current or concerned location and driving direction of the vehicle is acquired, and then a honking forbidden or restriction mode is initiated in which the horn (3) is deactivated or the sound of the horn (3) is controlled to be lower than a certain level, or a honking must mode is initiated in which the horn (3) is operated automatically to produce sound.

Figure 1
AUTOMATIC VEHICLE HORN CONTROL SYSTEM AND METHOD

TECHNICAL FIELD

The present invention relates to a system and a method for automatically operating a horn of a motor vehicle or warning the driver based on specified horn operating regulations.

BACKGROUND ART

It is known that a horn, although indispensable for a vehicle, produces noise. Thus, in some areas, such as in central cities, near hospitals, schools or zoos, etc., honking (operating a horn to generate sound) is prohibited by law or regulation.

On the contrary, in some other areas, it is required a driver to operate the horn to generate sound to draw people or animals’ attention to the vehicle.

In general, there are traffic signs in various areas to notice the drivers not to operate horns or must initiate horns to generate sound. Additionally or alternatively, local governments may issue permanent or temporary regulations on the operation of horns.

However, some drivers may not see such traffic signs or forget or do not know such regulations, especially in those areas that they are not familiar with, and thus operate horns in a wrong way against the traffic signs or regulations, which may be annoying or harmful, or even dangerous.

Thus, it needs to provide a technical solution for automatically operating a horn of a vehicle or creating an alarm to the driver to perform such operation in those areas that have specified horn operating regulations.

SUMMARY OF INVENTION

An object of the present invention is to provide a system and a method to satisfy the above need.

To achieve the above object, the present invention in a first aspect provides an automatic vehicle horn control system comprising:

a control unit in which operation programs and configurable parameters are stored;
a horn connected to the control unit and configured to receive command from the control unit; and

horn-operating-regulation acquisition means coupled with the control unit and configured to acquire information about horn operating regulation related with current or concerned location and driving direction of the vehicle;

wherein, in accordance with the information acquired by the horn-operating-regulation acquisition means,

a) if at current or concerned location and in current or concerned driving direction it is not allowed to operate the horn to produce sound or the sound level is not allowed to be higher than a certain level, then the control unit initiates a honking forbidden or restriction mode in which the horn is deactivated or the sound of the horn is controlled to be lower than a certain level, and/or an alarm indicating the honking forbidden or restriction requirement is generated, and/or

b) if at current or concerned location and in current or concerned driving direction it is required to operate the horn to produce sound, then the control unit initiates a honking must mode in which the horn is operated automatically to produce sound, and/or an alarm indicating the honking must be performed is generated; and

c) if at current or concerned location and in current or concerned driving direction there is not any requirement to horn operation, then the control unit maintains a free mode in which the driver may decide whether to operate the horns or not according to real traffic condition.

In accordance with a preferred embodiment of the invention, the horn-operating-regulation acquisition means comprises:

a positioning system which is coupled to the control unit for and is configured to provide current location and driving direction of the vehicle to the control unit and a digital map in which requirements to horn operation are stored and which is coupled to the control unit via a map interface; and/or

a traffic sign identifying device which is configured to read road traffic signs or electronic traffic marks and to provide corresponding information including location and direction where they should apply to the control unit.
In accordance with another preferred embodiment of the invention, the digital map is carried by the vehicle.

In accordance with another preferred embodiment of the invention, the digital map is provided in a traffic control center or a service provider, and the map interface is a wireless interface configured to exchange data with the traffic control center or the service provider.

In accordance with another preferred embodiment of the invention, the positioning system comprises a satellite positioning system.

In accordance with another preferred embodiment of the invention, the positioning system further comprises supplementary sensors, such as Tacho/ABS sensors or Gyro sensors.

In accordance with another preferred embodiment of the invention, the alarm is an audio alarm and/or an optical/video alarm.

In accordance with another preferred embodiment of the invention, the automatic vehicle horn control system further comprises a human-machine interface coupled to the control unit and configured to input parameters, setting system configuration, and outputting operation indications.

The present invention in a second aspect provides an automatic vehicle horn control method comprising:

a) acquiring information about horn operating regulation related with current or concerned location and driving direction of the vehicle;

b) if at current or concerned location and in current or concerned driving direction it is not allowed to operate the horn to produce sound or the sound level is not allowed to be higher than a certain level, then a honking forbidden or restriction mode is initiated in which the horn is deactivated or the sound of the horn is controlled to be lower than a certain level, and/or an alarm indicating the honking forbidden or restriction requirement is generated, and/or

c) if at current or concerned location and in current or concerned driving direction it is required to operate the horn to produce sound, then a honking must mode is initiated in which the horn is operated automatically to produce sound, and/or an alarm indicating
the honking must be performed is generated; and

d) if at current or concerned location and in current or concerned driving direction there is not any requirement to horn operation, then a free mode is maintained in which the driver may decide whether to operate the horns or not according to real traffic condition.

In accordance with a preferred embodiment of the invention, the information about horn operating regulation related with current or concerned location and driving direction of the vehicle is acquired by:

obtaining current location and driving direction of the vehicle by a positioning system or inputting concerned location and driving direction of the vehicle, and fitting current or concerned location and driving direction of the vehicle into a digital map in which requirements to horn operation are stored; and/or

reading road traffic signs or electronic traffic marks by a traffic sign identifying device.

According to the invention, at a location that honking is forbidden or restricted, the horn of a vehicle is automatically deactivated or the sound level is lowered, and/or the driver receives an alarm that the horn should not be used. Thus, horn noise will be effectively controlled in specified areas. In addition, at a location that honking must be performed, the horn of a vehicle is automatically operated to generate sound, and/or the driver receives an alarm that the horn should be operated to generate sound. Thus, traffic safety can be improved.

BRIEF INTRODUCTION TO THE DRAWINGS

The present invention will be described in details with reference to the drawings, in which:

Figure 1 is a schematic block diagram showing an automatic control system for a horn of a vehicle according to an embodiment of the present invention;

Figure 2 is a schematic block diagram showing an automatic control system for a horn of a vehicle according to another embodiment of the present invention;

Figure 3 is a schematic block diagram showing an automatic control system for a horn of a vehicle according to yet another embodiment of the present invention; and
Figure 4 is a flow chart showing an automatic vehicle horn control method which may be used with the automatic control system of Figure 1;

Figure 5 is a flow chart showing an automatic vehicle horn control method which may be used with the automatic control system of Figure 2;

Figure 6 is a flow chart showing an automatic vehicle horn control method which may be used with the automatic control system of Figure 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In general, the invention relates to a technique of initiating a horn operation mode in a vehicle in responding to a signal representing a specified horn operating regulation.

The signal may be created by adopting a positioning system, such as a satellite positioning system (for example, a GPS), and a digital map, and/or by adopting a traffic sign identifying device.

The horn operation mode may be such a mode in which, when the signal indicates that honking is forbidden or the sound level is not allowed to be higher than a certain level, a “honking forbidden or restriction” mode is initiated, in which the horn is deactivated, or the sound level of the horn is restricted to be under a certain level, or an alarm is created to let the driver know the forbidden or restriction condition, and when the signal indicates that honking is must to be performed, a “honking must” mode is initiated, in which the horn is activated to generate sound automatically, or an alarm is created to inform the driver to operate the horn.

The alarm may be an audio alarm or an optical/video alarm or both.

It is now that there are traffic signs indicating specified horn operating regulations arranged in those locations that have specified horn operating regulations, for example, along roads or in areas. Those signs may indicate specified points, such as a joint or an intersection of roads, specified segments, such as a distance of road or a segment of street, or specified sections, such as a living block or a government working area.

A traffic sign identifying device carried by a vehicle may capture those traffic signs and create a corresponding signal.

Electronic traffic marks may also be arranged in those locations. For example, an electric transmitter may send out a wireless signal which can be received by an electric
receiver carried a vehicle.

Additionally or alternatively, a digital map may be provided onboard, i.e., carried by a vehicle, or offboard, for example, provided in a traffic control center or a service provider. The locations that have specified horn operating regulations are combined into the map. Current location of the vehicle may be identified by a positioning system. If the digital map is provided in the traffic control center or the service provider, the vehicle is provided with a wireless interface which exchanges data with the traffic control center or the service provider.

Anyway, the vehicle may receive a signal indicating the information about the horn operating regulation at current location.

If there is not any traffic sign or regulation on horn operating regulations at a location, the vehicle at this location may have its horn working in a free mode in which the drivers may decide whether to operate the horns or not according to real traffic condition.

As the positioning system, it may be composed of at least a satellite positioning system (for example, a GPS). In addition, supplementary sensors, such as Tacho/ABS sensors for measuring traveling distances and/or Gyro sensors for measuring the angular changing of vehicles, may be incorporated for improving positioning reliability and/or compensating satellite positioning error. By means of the positioning system, current location and driving direction of the vehicle can be got. Then, current or concerned location and driving direction are taken into consideration together with corresponding data of the digital map. If, according to the digital map, the vehicle is at a location and direction that the horn is not allowed to generate sound or the sound level is not allowed to be higher than a certain level, then a “honking forbidden or restriction” mode as described above is initiated; on the contrary, if according to the digital map, the vehicle is at a location and direction that the horn must sound, then a “honking must” mode as described above is initiated; and finally, if there is not any horn operating regulation, the driver may decide to operate or not to operate the horn according to real traffic condition.

In the case of an offboard digital map, a neighboring area around current location of the vehicle can be transmitted from the traffic control center or the service provider to the vehicle via the wireless interface, and then the horn operation mode can be determined
in the vehicle. Alternatively, current location and direction of the vehicle can be transmitted to the traffic control center or the service provider via the wireless interface. The horn operation mode can be determined in the traffic control center or the service provider and sent back to the vehicle.

Permanent or temporary regulations on the operation of horns issued by the government may also be sent to the traffic control center or the service provider.

By using a digital map, horn operation modes can be set before reaching the specified locations, especially when vehicle navigation is activated.

When a traffic sign identifying device is adopted, as describe above, the traffic sign identifying device reads traffic signs or electronic traffic marks, and then a horn operation mode is set.

It can be understood that a vehicle may incorporate both the digital map and the positioning system, and the traffic sign identifying device.

For controlling the operation of the horn, a horn controlling device is provided in the vehicle. The horn controlling device receives signals or information about the specified horn operating regulations and then set the horn of the vehicle into a corresponding operation mode.

At the locations that the horns must sound, there can be generally regulations on the honking time and duration and sound level. On the other hand, at the locations that the horns are not allowed to generate sound or the sound level is not allowed to be higher than a certain level, there can be generally regulations on the forbidden or restriction dates or time periods in a day. These parameters are also adopted for controlling the operation of the horn.

When establishing such regulations, equilibrium between noise level and traffic safety should be considered.

Now some preferred embodiments of the invention will be described with reference to the drawings.

Figure 1 shows a block diagram of an automatic vehicle horn control system according to a first embodiment of the present invention. In this embodiment, the automatic horn control system comprises a control unit 1, into which programs for controlling and
configurable parameters such as languages, deactivating the horn (or mute state),
lowering the sound level of the horn, etc., can be stored.

An HMI (human-machine interface) 2 is coupled to the control unit 1 for inputting
parameters, setting system configuration, and outputting operation indications.

A horn 3 is connected to the control unit 1 and receives command from the control unit.
The horn 3 operates in three modes, i.e., a “honking forbidden or restriction” mode, a
“honking must” mode and a free mode as described above.

A positioning system 4 is coupled to the control unit 1 for providing current location
and driving direction of the vehicle to the control unit.

A digital map 5 is coupled to the control unit 1 via a map interface 6. The control unit 1
fits current or concerned location and driving direction of the vehicle into the digital
map and gets information about specified horn operating regulations related with this
position and direction. The digital map 5 may be provided onboard or offboard. In the
case of an offboard digital map, the digital map is arranged in a traffic control center or
a service provider and the map interface 6 is a wireless interface.

The positioning system 4, the digital map 5 and the map interface 6 compose a
horn-operating-regulation acquisition means.

In accordant with the information provided by the horn-operating-regulation acquisition
means, the control unit 1 initiates a corresponding operation mode.

An automatic horn control method which may be used with the automatic horn control
system of the first embodiment of the invention will be described with reference to
Figure 4.

As shown in Figure 4, in step S1, a driver starts driving a vehicle.

Then, in step S2, the control unit 1 obtains current location and driving direction of the
vehicle from the positioning system 4.

Then, in step S3, current location and driving direction of the vehicle are fit into the
digital map and the information about specified horn operating regulations related with
this position and direction is obtained.

Then, in step S4, it will judge whether honking is forbidden or restricted for current
location and direction. If the judge result of step S4 is “Yes”, then the operation goes to step S41 to initiate a “honking forbidden or restriction” mode wherein the horn 3 is deactivated or the sound level of horn is lowered to be below a certain level, and/or an audio or optical/video alarming signal is sent out to let the driver know the forbidden or restriction requirement. After step S41, the operation goes to step S7 which will be described below.

On the other hand, if the judge result of step S4 is “No”, then the operation goes to step S5 to judge whether it must to operate the horn to generate sound for current location and direction. If the judge result of step S5 is “Yes”, then the operation goes to step S51 to initiate a “honking must” mode wherein the horn 3 is activated to generate sound and/or an audio or optical/video alarming signal is sent out to let the driver know the honking requirement. After step S51, the operation goes to step S7 which will be described below.

On the other hand, if the judge result of step S5 is “No”, then the operation goes to step S6 where the operation is in a free mode in which the driver may decide whether to operate the horn according to real traffic condition.

Then, the operation goes to step S7 to judge whether the driving is ended. If the judge result of step S7 is “Yes”, then the operation goes to step S8 where the operation of the automatic vehicle horn control system is ended. On the other hand, if the judge result of step S7 is “No”, then the operation goes back to step S2.

Figure 2 shows a block diagram of an automatic vehicle horn control system according to a second embodiment of the present invention. The second embodiment also comprises a control unit 1, an HMI (human-machine interface) 2 and a horn 3 which are similar to those disclosed in the first embodiment.

However, the automatic vehicle horn control system according to the second embodiment does not comprise the positioning system 4, the digital map 5 and the map interface 6. Instead, the automatic vehicle horn control system according to the second embodiment comprises a traffic sign identifying device 7 which reads traffic signs or electronic traffic marks and provides corresponding information to the control unit 1 which then set the horn operation mode.

The traffic sign identifying device 7 composes a horn-operating-regulation acquisition means.
Other aspects of the automatic vehicle horn control system according to the second embodiment are similar to that of the first embodiments and thus are not described.

An automatic horn control method which may be used with the automatic horn control system of the second embodiment of the invention is shown in Figure 5.

The method shown in Figure 5 is different with that shown in Figure 4 in that steps S2 and S3 are substituted with step S2’. So only step S2’ will be described below.

In step S2’, the traffic sign identifying device 7 reads traffic signs or electronic traffic marks and provides corresponding information to the control unit 1 which then perform the operation of step S4.

Other steps of method shown in Figure 5 are similar to that shown in Figure 4 and thus are not described.

Figure 3 shows a block diagram of an automatic vehicle horn control system according to a third embodiment of the present invention. It can be seen that the third embodiment is a combinations of the first and second embodiments. This to say, the third embodiment comprises a control unit 1, an HMI (human-machine interface) 2, a horn 3, a positioning system 4, a digital map 5, a map interface 6 and a traffic sign identifying device 7. These components are similar to those disclosed in the first and second embodiments and thus are not described.

An automatic horn control method which may be used with the automatic horn control system of the third embodiment of the invention is shown in Figure 6. It can be seen that step S2” shown in Figure 6 is a combination of steps S2 and S3 shown in Figure 4 and step S2’ shown in Figure 5.

Other steps of method shown in Figure 6 are similar to that shown in Figures 4 and 5 and thus are not described.

According to the invention, at a location that honking is forbidden or restricted, the horn of a vehicle is automatically deactivated or the sound level is lowered, and/or the driver receives an alarm that the horn should not be used. Thus, horn noise will be effectively controlled in specified areas. In addition, at a location that honking must be performed, the horn of a vehicle is automatically operated to generate sound, and/or the driver receives an alarm that the horn should be operated to generate sound. Thus, traffic safety can be improved.
The present invention is not to be limited in scope by the specific embodiments described herein. Indeed, various modifications of the invention in addition to those described herein will become apparent to those skilled in the art from the foregoing description and accompanying drawings. Such modifications are intended to fall within the scope of the claims.
CLAIMS:

1. An automatic vehicle horn control system comprising:

   a control unit in which operation programs and configurable parameters are stored;

   a horn connected to the control unit and configured to receive command from the control unit; and

   horn-operating-regulation acquisition means coupled with the control unit and configured to acquire information about horn operating regulation related with current or concerned location and driving direction of the vehicle;

   wherein, in accordance with the information acquired by the horn-operating-regulation acquisition means,

   a) if at current or concerned location and in current or concerned driving direction it is not allowed to operate the horn to produce sound or the sound level is not allowed to be higher than a certain level, then the control unit initiates a honking forbidden or restriction mode in which the horn is deactivated or the sound of the horn is controlled to be lower than a certain level, and/or an alarm indicating the honking forbidden or restriction requirement is generated, and/or

   b) if at current or concerned location and in current or concerned driving direction it is required to operate the horn to produce sound, then the control unit initiates a honking must mode in which the horn is operated automatically to produce sound, and/or an alarm indicating the honking must be performed is generated; and

   c) if at current or concerned location and in current or concerned driving direction there is not any requirement to horn operation, then the control unit maintains a free mode in which the driver may decide whether to operate the horns or not according to real traffic condition.

2. The automatic vehicle horn control system of claim 1, wherein the horn-operating-regulation acquisition means comprises:
a positioning system which is coupled to the control unit for and is configured to provide current location and driving direction of the vehicle to the control unit and a digital map in which requirements to horn operation are stored and which is coupled to the control unit via a map interface; and/or

a traffic sign identifying device which is configured to read road traffic signs or electronic traffic marks and to provide corresponding information to the control unit.

3. The automatic vehicle horn control system of claim 2, wherein the digital map is carried by the vehicle.

4. The automatic vehicle horn control system of claim 2, wherein the digital map is provided in a traffic control center or a service provider, and the map interface is a wireless interface configured to exchange data with the traffic control center or the service provider.

5. The automatic vehicle horn control system of claim 2, wherein the positioning system comprises a satellite positioning system.

6. The automatic vehicle horn control system of claim 5, wherein the positioning system further comprises supplementary sensors, such as Tacho/ABS sensors or Gyro sensors.

7. The automatic vehicle horn control system of any one of claims 1 to 6, wherein the alarm is an audio alarm and/or an optical/ video alarm.

8. The automatic vehicle horn control system of any one of claims 1 to 6, further comprising a human-machine interface coupled to the control unit and configured to input parameters, setting system configuration, and outputting operation indications.
9. An automatic vehicle horn control method comprising:

a) acquiring information about horn operating regulation related with current or concerned location and driving direction of the vehicle;

b) if at current or concerned location and in current or concerned driving direction it is not allowed to operate the horn to produce sound or the sound level is not allowed to be higher than a certain level, then a honking forbidden or restriction mode is initiated in which the horn is deactivated or the sound of the horn is controlled to be lower than a certain level, and/or an alarm indicating the honking forbidden or restriction requirement is generated, and/or

c) if at current or concerned location and in current or concerned driving direction it is required to operate the horn to produce sound, then a honking must mode is initiated in which the horn is operated automatically to produce sound, and/or an alarm indicating the honking must be performed is generated; and

d) if at current or concerned location and in current or concerned driving direction there is not any requirement to horn operation, then a free mode is maintained in which the driver may decide whether to operate the horns or not according to real traffic condition.

10. The automatic vehicle horn control method of claim 9, wherein the information about horn operating regulation related with current or concerned location and driving direction of the vehicle is acquired by:

obtaining current location and driving direction of the vehicle by a positioning system or inputting concerned location and driving direction of the vehicle, and fitting current or concerned location and driving direction of the vehicle into a digital map in which requirements to horn operation are stored; and/or

reading road traffic signs or electronic traffic marks by a traffic sign identifying device.
AMENDED CLAIMS
received by the International Bureau on 29 December 2010 (29.12.2010)

1. (Original) An automatic vehicle horn control system comprising:

a control unit in which operation programs and configurable parameters are stored;

a horn connected to the control unit and configured to receive command from the control unit; and

horn-operating-regulation acquisition means coupled with the control unit and configured to acquire information about horn operating regulation related with current or concerned location and driving direction of the vehicle;

wherein, in accordance with the information acquired by the horn-operating-regulation acquisition means,

a) if at current or concerned location and in current or concerned driving direction it is not allowed to operate the horn to produce sound or the sound level is not allowed to be higher than a certain level, then the control unit initiates a honking forbidden or restriction mode in which the horn is deactivated or the sound of the horn is controlled to be lower than a certain level, and/or an alarm indicating the honking forbidden or restriction requirement is generated, and/or

b) if at current or concerned location and in current or concerned driving direction it is required to operate the horn to produce sound, then the control unit initiates a honking must mode in which the horn is operated automatically to produce sound, and/or an alarm indicating the honking must be performed is generated; and

c) if at current or concerned location and in current or concerned driving direction there is not any requirement to horn operation, then the control unit maintains a free mode in which the driver may decide whether to operate the horns or not according to real traffic condition.

2. (Original) The automatic vehicle horn control system of claim 1, wherein the horn-operating-regulation acquisition means comprises:

a positioning system which is coupled to the control unit for and is configured to
provide current location and driving direction of the vehicle to the control unit and a
digital map in which requirements to horn operation are stored and which is coupled to
the control unit via a map interface; and/or

a traffic sign identifying device which is configured to read road traffic signs or
electronic traffic marks and to provide corresponding information to the control unit.

3. (Original) The automatic vehicle horn control system of claim 2, wherein the digital
map is carried by the vehicle.

4. (Original) The automatic vehicle horn control system of claim 2, wherein the digital
map is provided in a traffic control center or a service provider, and the map interface is
a wireless interface configured to exchange data with the traffic control center or the
service provider.

5. (Original) The automatic vehicle horn control system of claim 2, wherein the
positioning system comprises a satellite positioning system.

6. (Original) The automatic vehicle horn control system of claim 5, wherein the
positioning system further comprises supplementary sensors, such as Tacho/ABS
sensors or Gyro sensors.

7. (Original) The automatic vehicle horn control system of any one of claims 1 to 6,
wherein the alarm is an audio alarm and/or an optical/video alarm.

8. (Original) The automatic vehicle horn control system of any one of claims 1 to 6,
further comprising a human-machine interface coupled to the control unit and
configured to input parameters, setting system configuration, and outputting operation
indications.
9. (Original) An automatic vehicle horn control method comprising:

a) acquiring information about horn operating regulation related with current or concerned location and driving direction of the vehicle;

b) if at current or concerned location and in current or concerned driving direction it is not allowed to operate the horn to produce sound or the sound level is not allowed to be higher than a certain level, then a honking forbidden or restriction mode is initiated in which the horn is deactivated or the sound of the horn is controlled to be lower than a certain level, and/or an alarm indicating the honking forbidden or restriction requirement is generated, and/or

c) if at current or concerned location and in current or concerned driving direction it is required to operate the horn to produce sound, then a honking must mode is initiated in which the horn is operated automatically to produce sound, and/or an alarm indicating the honking must be performed is generated; and

d) if at current or concerned location and in current or concerned driving direction there is not any requirement to horn operation, then a free mode is maintained in which the driver may decide whether to operate the horns or not according to real traffic condition.

10. (Original) The automatic vehicle horn control method of claim 9, wherein the information about horn operating regulation related with current or concerned location and driving direction of the vehicle is acquired by:

obtaining current location and driving direction of the vehicle by a positioning system or inputting concerned location and driving direction of the vehicle, and fitting current or concerned location and driving direction of the vehicle into a digital map in which requirements to horn operation are stored; and/or

reading road traffic signs or electronic traffic marks by a traffic sign identifying device.

11. (New) A control unit for an automatic vehicle horn control system, in which operation programs and configurable parameters are stored for performing the automatic vehicle horn control method of claim 9 or 10.
Figure 3
Start driving

S1

Obtaining related horn operating regulations as well as location and direction where they should apply by traffic sign identifying device

S2'

S4

Not allowing to operate horn or having a limit to sound level?

Yes

S41

Initiating honking forbidden or restriction mode, and/or generating alarm

No

S5

Must operate horn?

Yes

S51

Initiating honking must mode, and/or generating alarm

No

S6

Initiating free mode

S7

Driving ended?

Yes

End

S8

Figure 5
Start driving

S1

Obtaining related horn operating regulations as well as location and direction where they should apply by traffic sign identifying device and/or by positioning system and digital map

S2"

S4

Not allowing to operate horn or having a limit to sound level?

Yes

S41

Initiating honking forbidden or restriction mode, and/or generating alarm

No

S5

Must operate horn?

Yes

S51

Initiating honking must mode, and/or generating alarm

No

S6

Initiating free mode

S7

Driving ended?

S8

End

Figure 6
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet
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)

IPC: B60Q, G08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPDOC, WPI, CNKI, CNPAT: VEHICLE, HORN, LOUDHAILER, HOWLING, SPEAKER, BEEPER, FORBID+, PROHIBIT+, RESTRICT+, INHIBIT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>A</td>
<td>CN239446Y (MU, Zhongyi) 22 Sep.1999 (22.09.1999) see the whole document</td>
<td>1-10</td>
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<tr>
<td>A</td>
<td>CN2414952Y (YU, Zhuanghao) 17 Jan.2001 (17.01.2001) see the whole document</td>
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<td>A</td>
<td>CN1221936A (Shenzhen Wanguan Industry Development Ltd.) 07 Jul.1999 (07.07.1999) see the whole document</td>
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<td>A</td>
<td>CN2768105Y (GE, Xiaosong) 29 Mar.2006 (29.03.2006) see the whole document</td>
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<td>A</td>
<td>US20080291034A1 (Kernwein) 27 Nov.2008 (27.11.2008) see the whole document</td>
<td>1-10</td>
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search 09 Jul.2010 (09.07.2010)

Date of mailing of the international search report 22 Jul. 2010 (22.07.2010)

Name and mailing address of the ISA/CN
The State Intellectual Property Office, the P.R.China
6 Xitucheng Rd., Jinmen Bridge, Haidian District, Beijing, China 100088
Faesimile No. 86-10-62019451

Authorized officer YANG Guoxin
Telephone No. (86-10)62085433

Form PCT/ISA/210 (second sheet) (July 2009)
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INTERNATIONAL SEARCH REPORT

CLASSIFICATION OF SUBJECT MATTER

B60Q 5/00 (2006.01) i
G08G 1/00 (2006.01) i