Title: A ROAD CONE AND SYSTEM FOR MONITORING THEREOF ALONG WITH OTHER TEMPORARY ROAD SIGNS

Abstract: A road cone (10) equipped with a GPS system (18) comprising a GPS receiver, a processing unit containing programmable identity means and processing means with standard geographic reference information to establish a position and a transmitter to transmit position and identity information.
A Road Cone and system for monitoring thereof along with other temporary road signs

The present invention relates to a road cone and a system for monitoring thereof including monitoring of other temporary road signs.

Currently road cones or other temporary traffic signs are laid out across roads throughout a road network by contractors working on the network. Such devices are designed to control traffic while roadworks proceed or other necessary highway works are carried out. This often results in extensive traffic jams or such like as the roads are constricted and large volumes of traffic build up.

In the past the monitoring of such systems has been carried out by verbal or written reporting to a central authority. This authority may be a public body or alternatively the contractor charged with maintaining that stretch of road. The contractor or the public authority then uses this information to provide the travelling public, emergency services or road user organisations such as the Automobile Association with travel information. The problem with such reporting techniques is that the reports are often inaccurate and out of date by the time they are disseminated.

It is an aim of the present invention to provide a system whereby the ability to monitor and plan road works involving the use of road cones or temporary signage is improved such that the public can better plan their journeys and so that a historic and current record of the
disposition of road cones or temporary highway signage is established.

Accordingly a first aspect of the present invention is directed to a road cone equipped with a GPS system comprising a GPS receiver, a processing unit containing programmable identity means and processing means with standard geographic reference information to establish a position and a transmitter to transmit position and identity information. This provides the advantage that the road cone processes global positioning information from overhead satellites relative to pre-stored geographic position data and then transmits its position along with its identity information to a central monitoring system. This enables the position to the road cone to be monitored precisely giving the road managers accurate realtime information about the disposition of the road cone.

Advantageously the GPS system is a separable unit. This provides the advantage that if the cone itself is damaged the GPS system can be removed and placed in a new cone.

Advantageously the GPS system is held in the cone by a system of lugs placed around the inside of the top of the cone. This provides the advantage that the GPS system can be easily pushed up inside the cone.

In a preferred embodiment the GPS system has a shape that matches the inside cone.

Advantageously the GPS system has an annular hole through the middle of it to allow road cone control
objects placed through the top of the cone to pass through it. This has the advantage that a cone equipped with a GPS system retains the same features as an ordinary cone.

Advantageously the GPS system is equipped with a separable power unit. This would enable easy battery changes, with a separate power unit containing batteries, as often it would not be appropriate under weather conditions to open up the inside and remove batteries from the GPS system.

Preferably the GPS system is equipped with an on/off switch which on switching on/off results in a signal being sent indicating the status of the road cone. This has the advantage that the central monitoring system can be informed that the road cone is now active or that the road cone is no longer active the road works having finished.

A second aspect of the invention is directed to a GPS system described above adapted to fit inside a road cone and equipped with attachment means. This provides the advantage that GPS system can be placed in any existing road cone.

A third aspect of the invention relates to a system for the monitoring of such road cones or other road signage equipped with similar GPS systems which comprises a receiver for receiving the position information and identity information from the cone or other signage, a processor which is equipped with a register of identity information, which then compares the position and
identity information with the register and places this information on a standard geographic map and creates a record of the information in a memory, and display means to show this information to a user of the system. This provides the advantage that the deployment of signage or road cones across a whole road network can be monitored to enable better management of the roads and to provide information to users of the road network.

Advantageously the information output is provided via an internet link or in car information system to enable access by third parties. This provides the advantage that such a system can be used to provide information to the general public.

A fourth aspect of the present invention relates to a program for controlling the central monitoring system.

An example of a road cone and monitoring system made in accordance with the present invention will now be described herein below with reference to the accompanying drawings, in which:

Figure 1 is a schematic cross section of a road cone; and

Figure 2 is a system logic diagram for the central monitoring system.

In Figure 1 a road cone 10 is shown which comprises a base 12 and a cone part 14. The top of the cone part 14 has a hole 16. Inside the cone part 14 is placed the GPS system 18. The GPS system 18 is shaped to fit inside the interior of the cone part 14. The GPS system 18 is
held in position by a series of lugs 20 round the inside of the cone part 14. The GPS system 18 contains an annular hole 22 through it, which enables the insertion of ancillary traffic management equipment into the cone 10. The GPS system 18 comprises a GPS receiver which receives signals from GPS satellites, a computing processing unit for processing the signals and comparing them versus standard geographic reference points to enable it to determine its position of the cone, identity means which is pre-programmed with an identification for the cone such as the number of the cone, the owner and the project it is involved with, a transmitter for transmitting the position and identification information to a central monitoring system, and a separable power unit which contains one or more batteries.

The GPS system 18 can either be made as an integral part of the cone 10 which may be preferable to stop tampering with or removal of the GPS system or it may be a separate part to enable replacement of the cone 10 or the GPS system 18.

The GPS system is equipped with an on/off switch (not show) by which it is switched on and off. The switch may be on the outside of the road cone. When it is switched on and off the GPS system transmits a signal indicating respectively that it is on or that it is being switch off as the work has been completed.

Figure 2 shows the logic diagram for monitoring the position of the cone 10. It is equally possible to equip other temporary road signage with such a GPS system, other such signage may include for instance speed cameras, temporary road signs, temporary crash barriers,
vehicles that are part of roadworks. The central monitoring system will have a receiver for receiving the information and it will have a processing unit to process this information and it will have a standard geographic map to place the positions of the individual equipment on, it will have a register which contains information about the identification of a deployed equipment, a memory to enable a historical record of the placement of equipment be maintained and it will then have output or display means by which the information is displayed. Furthermore it may have an output by which the information can be saved to other facilities or displayed on for instance the Internet.

Figure 2 shows in Box 30 the GPS system in the road cone receiving signals from the GPS satellite. In Box 32 the GPS system in the road cone computes the information about position in relation to the mapping reference points. In Box 34 the GPS system in the road cone transmits its computed position and identification information to a communications network. In Box 36 the communications network delivers positional identification information to the central monitoring system. In Box 38 a computer program in the central monitoring system displays and stores a record of the information of the position of the road cone on a database or in a memory. In Box 40 the information in the central monitoring system is distributed to parties requesting it.
Claims

1. A road cone equipped with a GPS system comprising a GPS receiver, a processing unit containing programmable identity means and processing means with standard geographic reference information to establish a position and a transmitter to transmit position and identity information.

2. A road cone according to claim 1, in which the GPS system is a separable unit.

3. A road cone according to claim 1 or claim 2, in which the GPS system is held in the cone by a system of lugs placed around the inside of the top of the cone.

4. A road cone according to claim 3, in which the GPS system has a shape that matches the inside cone.

5. A road cone according to claim 3 or claim 4, in which the GPS system has an annular hole through the middle of it to allow road cone control objects placed through the top of the cone to pass through it.

6. A road cone according to any preceding claim, in which the GPS system is equipped with a separable power unit.

7. A road cone according to any preceding claim, in which the GPS system is equipped with an on/off switch which on switching on/off results in a signal being sent indicating the status of the road cone.
8. A GPS system as described in any preceding claim adapted to fit inside a road cone and equipped with attachment means.

9. A system for the monitoring of road cones according to any one of claims 1 to 7 or other road signage equipped with similar GPS systems which comprises a receiver for receiving the position information and identity information from the cone or other signage, a processor which is equipped with a register of identity information, which then compares the position and identity information with the register and places this information on a standard geographic map and creates a record of the information in a memory, and display means to show this information to a user of the system.

10. A system according to claim 9, in which the information output is provided via an internet link or in-car information system to enable access by third parties. This provides the advantage that such a system can be used to provide information to the general public.

11. A computer program for controlling the central monitoring system according to claim 9 or claim 10.
Device in road cone receives signals from GPS satellites.

Device in road cone computes information about position in relation to mapping reference points.

Device in road cone transmits computed positional and identification information to communications network.

Communications network delivers positional and identification information to central monitoring system.

Computer programme in central monitoring system displays and stores records of information about position of roadcone in a memory or a database.

Information in central monitoring system distributed to parties requesting access to the system.
# INTERNATIONAL SEARCH REPORT

## A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E01F9/012

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 7 E01F

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 practical, search terms used)
EPO-Internal, PAJ, WPI Data

## 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>
</tr>
</thead>
</table>

Further documents are listed in the continuation of box C. Patent family members are listed in annex.

* Special categories of cited documents:

  1. "A" document defining the general state of the art which is not considered to be of particular relevance
  2. "E" earlier document but published on or after the international filing date
  3. "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)
  4. "O" document referring to an oral disclosure, use, exhibition or other means
  5. "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 data 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.

  *"A" document member of the same patent family.

Date of the actual completion of the international search: 12 November 2002

Date of mailing of the international search report: 19/11/2002

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2 NL–2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax. (+31-70) 340-3018

Authorized officer
Gevaerts, D
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP 10325115</td>
<td>A</td>
<td>08-12-1998</td>
<td>NONE</td>
</tr>
</tbody>
</table>