METHOD AND APPARATUS FOR DISPLAYING INFORMATION OF TRAFFIC SIGNAL

Provided are a method and apparatus for displaying information of a traffic signal in the form of a character, a symbol, or an emoticon. The apparatus includes: a wired/wireless communication means receiving predetermined information to be displayed from a central control center in wired/wireless; authentication means determining authenticity of the predetermined information received from the wired/wireless communication means; safety determination means determining whether drivers and pedestrians are safe, if it is determined that the received information is authentic, display means displaying the received information in a predetermined presentation form according to the result obtained by the safety determination means.
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Published: with international search report

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Description

METHOD AND APPARATUS FOR DISPLAYING INFORMATION OF TRAFFIC SIGNAL

Technical Field

[1] The present invention relates to a traffic signal, and more particularly to, a method and apparatus for displaying information of a traffic signal in the form of a character or an emoticon.

Background Art

[2] Generally, a traffic light is used to control the traffic and provides a driver or a pedestrian with a color signal or an arrow signal. However, such simple information cannot quickly satisfy the driver or the pedestrian who requires diverse and much traffic information.

[3] To solve this problem, some public institutions have introduced a wide area traffic control system for drivers and established wide laser emitting diode (LED) traffic electric signs in main highways, thereby providing drivers with various traffic information, e.g., traffic delay areas, driving speed information, etc., collected by the wide area traffic control system in real time.

Disclosure of Invention

Technical Problem

[4] However, since the electric sign is too expensive to be provided on all the highways, a driver cannot obtain necessary traffic information when the driver requiring traffic information left a place providing the wide LED traffic electric sign. Also, the wide LED traffic electric sign provides driving information only, whereas it does not provide pedestrian information.

Technical Solution

[5] The present invention provides a method and apparatus for displaying information of a traffic signal, by which diverse traffic information, safety information, and urgent messages or advertisements can be obtained via a laser emitting diode (LED) traffic signal provided at a traffic intersection and a crosswalk where drivers and pedestrians are awaiting.

Advantageous Effects

[6] As described above, the present invention does not divide the LED area of a conventional traffic signal and displays traffic information using a variety of presentation techniques of characters and symbols in addition to a simple color or an arrow symbol, thereby overcoming problems where traffic signals are simply displayed, the content of a traffic information display electric sign is obtained at a restricted area, and
pedestrians do not have access to necessary traffic information.

**Description of Drawings**

[7] FIG. 1 is a block diagram of an apparatus for displaying a traffic signal according to an embodiment of the present invention;

[8] FIG. 2 is a structural diagram for comparing conventional traffic signals with traffic signals according to an embodiment of the present invention;

[9] FIG. 3 is a structural diagram for comparing laser emitting diode (LED) arrangements displaying a conventional traffic signal and a traffic signal according to an embodiment of the present invention;

[10] FIG. 4 exemplarily illustrates a display unit that displays traffic information for drivers according to an embodiment of the present invention;

[11] FIG. 5 exemplarily illustrates a display unit that displays traffic information for pedestrians according to an embodiment of the present invention;

[12] FIG. 6 exemplarily illustrates a display unit that displays traffic and safety information for drivers and pedestrians according to an embodiment of the present invention; and

[13] FIG. 7 is a flowchart of a method of displaying information of a traffic signal according to an embodiment of the present invention.

**Best Mode**

[14] According to an aspect of the present invention, there is provided an apparatus for displaying information of a traffic signal, the apparatus comprising: wired/wireless communication means receiving predetermined information to be displayed from a central control center in wired/wireless; authentication means determining authenticity of the predetermined information received from the wired/wireless communication means; safety determination means determining whether drivers and pedestrians are safe, if it is determined that the received information is authentic; and display means displaying the received information in a predetermined presentation form according to the result obtained by the safety determination means.

[15] According to another aspect of the present invention, there is provided a method of displaying information of a traffic signal, the method comprising: receiving information from a central control center; checking authenticity of the information received from the central control center; determining whether drivers and pedestrians are safe, if it is determined that the received information is authentic; and displaying the received information in a predetermined presentation form according to the determination result.

**Mode for Invention**

[16] The present invention will now be described in detail with reference to the
FIG. 1 is a block diagram of an apparatus for displaying a traffic signal according to an embodiment of the present invention. Referring to FIG. 1, the apparatus according to an embodiment of the present invention does not use a conventional light bulb but high-brightness laser emitting diode (LED).

The apparatus includes a wired/wireless communication unit 110, a central processing unit (CPU) 150, and a display unit 140. The CPU 150 includes an information authenticator 120 and a safety determiner 130.

The wired/wireless communication unit 110 receives information to be displayed as an improved traffic signal from a central control center using wired/wireless communication. The wired/wireless communication unit 110 uses all the existing or upcoming mobile communication, a wireless local area network (LAN), an asymmetric digital subscriber line (ADSL), or a dedicated network, etc.

The information authenticator 120 authenticates the information received from the wired/wireless communication unit 110 and determines the authenticity of the information. The information authenticator 120 uses a method of determining authenticity of an information transmitting subject, e.g., an encryption method.

The safety determiner 130 determines if a driver or a pedestrian is safe by using a predetermined process before the information authenticated by the information authenticator 120 is displayed.

The display unit 140 displays the received information in the form of a character, a symbol, or an emoticon when the safety determiner 130 determines that display information can be safely provided to the driver or the pedestrian.

FIG. 2 is a structural diagram for comparing conventional traffic signals with traffic signals according to an embodiment of the present invention. Referring to FIG. 2, conventional traffic signals 210-1 and 210-2 have circular or square shapes. However, it is inconvenient to properly provide drivers or pedestrians with diverse information in the form of a character and symbol using the conventional traffic signals 210-1 and 210-2. Meanwhile, the traffic signals 220-1 and 220-2 according to an embodiment of the present invention do not included divided areas, but use the entire surface thereof, thereby providing drivers or pedestrians with diverse information in the form of a character or a symbol. The 'entire surface' is a surface on which LEDs are arranged. Therefore, when the LEDs are arranged on the panel displaying front/back surfaces of the traffic signals 220-1 and 220-2, both surfaces of the panel can be used to provide traffic information.

FIG. 3 is a structural diagram for comparing an LED arrangement for displaying a conventional traffic signal and a traffic signal according to an embodiment of the present invention. Referring to FIG. 3, if an LED area 310 of the conventional traffic
signal is enlarged, LEDs 320 displaying determined colors are arranged in divided areas, whereas, if an LED area 330 of the traffic signal according to an embodiment of the present invention is enlarged, LEDs 340 displaying three or more colors are densely arranged on the entire area. The traffic signal according to an embodiment of the present invention is displayed via a bundle of LEDs displaying three colors and a cover mirror 350 to display the uniform color information when a color of the three colors is displayed.

[25] FIG. 4 exemplarily illustrates a display unit that displays traffic information for drivers according to an embodiment of the present invention. Referring to FIG. 4, the display unit displays a stop signal using a red circular light 410, which is a part of the entire LED arrangement and is familiar with drivers, and a red character light 'STOP' 420, which is other part of the entire LED arrangement. In another embodiment, the display unit displays the stop signal using other color character light except the red character light 'STOP' 420. How to operate the LED traffic signal according to an embodiment of the present invention is not described.

[26] FIG. 5 exemplarily illustrates a display unit that displays traffic information for pedestrians according to an embodiment of the present invention. Referring to FIG. 5, the display unit displays a character light 'STOP' 530 instead of an existing stop signal for making pedestrians await.

[27] FIG. 6 exemplarily illustrates a display unit that displays traffic and safety information for drivers and pedestrians according to an embodiment of the present invention. Referring to FIG. 6, drivers can easily be informed that an '00' area is crowded through a '00 delay' message 610 displayed by the display unit of a traffic signal and that an average driving speed to an 'XX' area is 40 Km through an 'XX 40 Km' message 620. When a car accident occurs on the highway, a driver can be informed of this accident through an 'accident ahead' message 630. Since the traffic signal is displayed on a restricted screen display area, the display unit displays the messages in a predetermined interval or from right to left (in a manner of displaying broadcasting subtitles) on a screen. How to display traffic and safety information using the traffic signal is not described in the present invention. Also, since pedestrians can see the contents of the traffic signal from a shorter distance than the drivers, the display unit can display contents with smaller characters such as a 'typhoon Maemi northward typhoon warning issued nationwide' message 640.

[28] FIG. 7 is a flowchart of a method of receiving traffic information from a central control center and displaying information of a traffic signal for drivers or pedestrians using a variety of presentation techniques according to an embodiment of the present invention.

[29] The traffic signal performs a daily basic traffic control function (Operation 710).
The traffic signal uses various presentation techniques such as characters, symbols, or animation to provide drivers or pedestrians with traffic information.

While performing the basic traffic control function, the traffic signal confirms whether the traffic information is received from the central control system using a wired/wireless communication unit (Operation 720). If the traffic signal confirms that the traffic information is not received from the central control system, it keeps performing the basic traffic control function. If the traffic signal confirms that the traffic information is received from the central control system, it performs a predetermined authentication process to check authenticity of a traffic information transferring subject (Operation 730). If it is determined that the received traffic information is not authentic, the traffic signal keeps performing the basic traffic control function. If it is determined that the received traffic information is authentic, the traffic signal checks whether drivers or pedestrians are safe (Operation 740). The traffic signal checks whether safety of drivers or pedestrians is secured (Operation 750). If the traffic signal checks that safety of drivers or pedestrians is not secured, it stands by for a while (Operation 770). After the standby, the traffic signal checks again whether drivers or pedestrians are safe. If the traffic signal determines that drivers or pedestrians are safe, it displays the received traffic information in the form of on/off, characters, symbols, or emoticon in a simple way or animation or signal flow (Operation 760).

Also, whether the drivers or pedestrians are safe is determined by displaying a stop signal and checking whether a predetermined time has passed to recognize the stop signal by the drivers or pedestrians. Information relating to a method of displaying characters, symbols, or emoticon is received from the central control center or automatically executed by a program.

**Industrial Applicability**

The present invention can also be embodied as computer readable code on a computer readable recording medium. The computer readable recording medium is any data storage device that can store data which can be thereafter read by a computer system. Examples of the computer readable recording medium include read-only memory (ROM), random-access memory (RAM), CD-ROMs, magnetic tapes, floppy disks, optical data storage devices, and carrier waves. The computer readable recording medium can also be distributed network coupled computer systems so that the computer readable code is stored and executed in a distributed fashion.
Claims

[1] An apparatus for displaying information of a traffic signal, the apparatus comprising:
wire/wireless communication means receiving predetermined information to be displayed from a central control center in wired/wireless;
authentication means determining authenticity of the predetermined information received from the wired/wireless communication means;
safety determination means determining whether drivers and pedestrians are safe, if it is determined that the received information is authentic; and
display means displaying the received information in a predetermined presentation form according to the result obtained by the safety determination means.

[2] The apparatus of claim 1, wherein the wired/wireless communication means is one of mobile communication, a wireless local area network (LAN), an asymmetric digital subscriber line (ADSL), and a dedicated network.

[3] The apparatus of claim 1, wherein the display means includes the entire panel of the traffic signal including front and back panels on which laser emitting diodes (LEDs) are arranged.

[4] The apparatus of claim 1, wherein the display means is LED that displays three or more colors on the entire panel of the traffic signal.

[5] The apparatus of claim 4, wherein the LED that displays three or more colors are covered with a cover mirror to display uniform color information when one color is displayed.

[6] The apparatus of claim 1, wherein the safety determination means determines whether drivers or pedestrians stop driving or walking according to a predetermined process.

[7] A method of displaying information of a traffic signal, the method comprising:
receiving information from a central control center;
checking authenticity of the information received from the central control center;
determining whether drivers and pedestrians are safe, if it is determined that the received information is authentic; and
displaying the received information in a predetermined presentation form according to the determination result.

[8] The method of claim 7, wherein the received information comprises traffic and safety information, urgent messages, advertisements, and news.

[9] The method of claim 7, wherein, in the checking of the authenticity, it is determined whether an information transferring subject is authentic.
The method of claim 7, wherein the whether the drivers or the pedestrians are safe is determined by displaying a stop signal and checking whether a pre-determined time has passed to recognize the stop signal by the drivers or pedestrians.

The method of claim 7, wherein the received information is displayed as an on/off signal, an animation signal, a symbol signal, or a flow signal.
FIG. 6

OODELAY

XX 40Km

ACCIDENT AHEAD MESSAGE
FIG. 7

START

PERFORM BASIC TRAFFIC CONTROL FUNCTION

IS TRAFFIC INFORMATION RECEIVED?

YES 730

AUTHENTICATE RECEIVED INFORMATION

YES 740

IS RECEIVED INFORMATION AUTHENTIC?

YES

IS SAFETY SECURED?

NO 770

STANDBY

DISPLY RECEIVED INFORMATION

NO 750

YES 760
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

G08G 1/095 (2006.01)i
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)
IPC8 G08G 1/09 G06F 17/60 H04L 12/22

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
KOREAN PATENTS AND APPLICATIONS FOR INVENTIONS SINCE 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPI, PAJ "TRAFFIC" "AUTHEN" "LED" "SIGN" "WIRELESS"

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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<tbody>
<tr>
<td>Y</td>
<td>KR 10-0433667 B1 (RAEDEO CO) 31 MAY 2004 see the whole document</td>
<td>1-11</td>
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<td>Y</td>
<td>KR 10-0432236 B1 (KIM) 22 MAY 2004 see the whole document</td>
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<td>A</td>
<td>KR 2002-0065689 A (BOBOTEC LTD) 14 AUGUST 2002 see the whole document</td>
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□ Further documents are listed in the continuation of Box C.  □ See patent family annex.

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Date of the actual completion of the international search 31 JANUARY 2006 (31.01.2006)

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Facsimile No. 82-42-472-7140

Date of mailing of the international search report 31 JANUARY 2006 (31.01.2006)

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Form PCT/ISA/210 (second sheet) (April 2005)