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(54) **System and method for displaying information to drivers at traffic lights**

(57) An apparatus for displaying information messages on a roadway, the apparatus comprising :

- display means for displaying information messages,
- control means connected to said display means for controlling the display of information messages by said display means,

the apparatus being characterized in that it further comprises :

- Acquisition means for acquiring an acquired signal indicating that a traffic regulation signal is either in a first

state which forbids circulation of traffic or in a second state which allows circulation of traffic, and generating an output signal indicating whether said traffic signal is in the first state or the second state, and

- Synchronization means connected to the output of the acquisition means and to said control means, in order to selectively display information messages only when the traffic regulation signal is in the first state.

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Description

[0001] The present invention relates to an apparatus and a system for displaying information messages to automobile drivers on public or private roadways. The invention also concerns a related method for displaying information messages.

[0002] Conventional systems for providing information to automobile drivers (i.e., road-side signs) typically use a display means such as a billboard or any other type of support for carrying one or more information messages.

[0003] The information messages can be of any visual format, including text and/or images. The messages can include:

- information on the traffic condition and/or events which are located on the road ahead of the driver,
- commercial or promotional information,
- information on general interest such as weather conditions, stock market information,
- etc.

[0004] The above-mentioned conventional systems already exist, and they are used on a variety of roads.

[0005] Such known systems can typically include a panel sign disposed on the side of the road, or above it. The panel sign can carry fixed information (e.g. in the case of a panel with a fixed information, the information is fixed or painted onto the panel sign) or animated information (e.g. in the case of an animated panel with display means such as an array of lamps, LEDs or any other type of light source forming signs and/or images when individually connected to a source of electrical power).

[0006] Such known conventional systems are useful as they can provide information to the automobile drivers circulating on the road.

[0007] However, a risk associated with such conventional systems is that they can distract the driver from his driving and be a possible cause for perturbations in the traffic or accidents.

[0008] Also, these conventional systems often fail to attract the full attention of the driver to the messages displayed, because the driver reserves his attention for avoiding a traffic accident.

[0009] An objective of the present invention is to eliminate risks and problems associated with motorists being distracted by road-side signs.

[0010] In order to achieve this objective the invention proposes an apparatus for displaying information messages on a roadway, the apparatus comprising :

- display means for displaying information messages,
- control means connected to said display means for controlling the display of information messages by said display means,

the apparatus being characterized in that it further comprises :

- acquisition means for acquiring an acquired signal indicating that a traffic regulation signal is either in a first state which forbids circulation of traffic or in a second state which allows circulation of traffic, and generating an output signal indicating whether said traffic signal is in the first state or the second state, and
- synchronization means connected to the output of the acquisition means and to said control means, in order to selectively display information messages only when the traffic regulation signal is in the first state.

[0011] Said acquired signal is a control signal input into the traffic regulation signal that controls whether the traffic regulation signal is in the first state or the second state.

[0012] Moreover, said acquisition means are connected to an output of said traffic regulation signal and said acquired signal is directly acquired from the regulation signal and said connection between the acquisition means and the traffic regulation signal is a wireless connection.

[0013] Said traffic regulation signal regulates vehicle traffic and/or pedestrian traffic.

[0014] Furthermore, the apparatus comprises information message determining means determining the information message to be displayed and communicating the information message to be displayed to the control means, said control means causing the display means to display the information message.

[0015] Said information message determining means receives either information from sensors, and based on this information selects a predetermined information message from a memory means or the information message to be displayed from a remote source.

[0016] Another object of the invention relates to a method for displaying information messages on a roadway on an apparatus comprising :

- display means for displaying information messages,
- control means connected to said display means for controlling the display of information messages by said display means,

the method being characterized in that it comprises the steps of:

- acquiring a signal indicating that a traffic regulation signal is either in a first state which forbids circulation of traffic or in a second state which allows circulation of traffic,
- generating an output signal indicating whether said traffic signal is in the first state or the second state, and
- Synchronizing the output signal and control means of the apparatus,
- selectively displaying information messages only

when the traffic regulation signal is in the first state.

[0017] Said acquired signal is a control signal input into the traffic regulation signal that controls whether the traffic regulation signal is in the first state or the second state.

[0018] Moreover, said acquisition means are connected to an output of said traffic regulation signal and said acquired signal is directly acquired from the regulation signal and said connection between the acquisition means and the traffic regulation signal is a wireless connection.

[0019] Said traffic regulation signal regulates vehicle traffic and/or pedestrian traffic.

[0020] Furthermore, the method comprises the step of determining the information message to be displayed by an information message determining means and communicating the information message to be displayed to the control means, said control means causing the display means to display the information message.

[0021] Said information message determining means receives either information from sensors, and based on this information selects a predetermined information message from a memory means or the information message to be displayed from a remote source.

[0022] A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

Fig. 1 is an exemplary block diagram of a non-limiting embodiment of the claimed invention.

Fig. 2 is an exemplary block diagram of a computer system upon which an embodiment of the invention may be implemented.

[0023] Referring now to the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views.

[0024] Fig. 1 illustrates a non-limiting embodiment of the present invention. Traffic signal 1 includes a light emitting unit 2, which is configured to emit one of a red light, a green light, or an amber light. Traffic signal 1 also includes a power and control unit 3, which is configured to supply power to the light emitting unit, and to control which light is illuminated. When the control unit 3 applies a voltage across wires A and B, the red light (the upper most of the three lights shown in Fig. 1) will illuminate. Relay switch 4 is connected in parallel to the red light via wires C and D. Thus, wires C and D will experience the same voltage as wires A and B.

[0025] A voltage across wires C and D will cause a current to flow through them and the coil in relay switch 4. This flow of current will cause the coil to exert a magnetic force. This magnetic force will pull on the switch of the relay, which will be pulled in order to close the circuit.

This will allow wires E and F, along with the display and display power source to become a closed circuit. Thus, the display can only be on when the red light is illuminated.

[0026] In addition, alternative embodiments of the present invention may include digital logic circuits rather than a relay switch. The digital logic circuits may be configured to supply power to the display only when the red of the traffic signal is illuminated.

[0027] In the following description, the present invention will be called ROR panel according to the acronym « Read On Red panel ».

[0028] An ROR panel is an information presenting and gathering medium installed on, or at very close proximity, to road traffic signals. The panelpanels may include one or more sensors such as a thermometer, camera, barometer, a stock ticker, weather sensors, traffic sensors, etc. The panelpanels may also be interlinked with a central control center which will provide the content to be displayed on each panelpanel. The content to be displayed may depend on several variables, including but not limited to, the time of day and the location of the ROR.

[0029] In a non-limiting embodiment of the present invention, the panelpanel will deliver valuable information to motorists in a safe manner. Information will one be delivered via the panels' display when the traffic signal is displaying a red light (or some other signal indicating that traffic must stop). When the traffic signal displays a green or amber light (or when the traffic signal is in transition between lights), the panels' display is switched off automatically via a relay switch which causes the panels' display to blank out immediately regardless of what was on the display. This ensures that motorists will not be distracted by any of the displayed information and can continue their journey in a safe manner.

[0030] In a non-limiting embodiment of the present invention, the panel includes a processing unit, one or more sensors, a display screen, a safety transducer, a communication unit, and a power supply.

[0031] The processing unit may be a dedicated PC or dedicated hardware composed of microprocessors etc. configured to manage the display and to code/decode the data to be displayed and transmitted to/from the control center. The option of using a dedicated PC allows for more flexibility regarding the services that can be provided by the panel. In an embodiment of the present invention utilizing the dedicated PC, the dedicated PC will be configured to connect to a control center by using any of the standard communication protocols to obtain data to be displayed.

[0032] In a non-limiting embodiment of the present invention, the data to be displayed may be multimedia content. As the multimedia content may take up a large amount of bandwidth, the time to upload the multimedia content to the ROR panel needs to be considered. Thus, the type of connectivity between the ROR and the control center can vary according to the bandwidth requirements of the data being transmitted and received. This will be

discussed in further detail below along with the connectivity between the ROR and the control center.

[0033] In another non-limiting embodiment of the present invention, the processing unit is configured to determine the dependability of the network and the transmission of data between the control unit and the ROR. Some embodiments of the processing unit are configured to execute routines that ensure that the data being displayed is valid. For example, the processing unit may include a storage unit configured to store local copies of the data to be displayed if something goes wrong.

[0034] Furthermore, non-limiting embodiments of the processing unit are configured to keep track of currently displayed media and the timings of this media. For example, if the data is suppose to be displayed between 1 :00 pm and 2 :00 pm, the processing unit will keep track of when the data is displayed.

[0035] In another non-limiting embodiment of the present invention, the processing unit may interact with the safety transducer (discussed below) to reset the display on activation of the transducer so as to display a static message such as drive safely. In this embodiment, the processing unit is electrically linked to the transducer, and the processing unit is configured to change program logic depending on the state of the transducer.

[0036] In another non-limiting embodiment of the present invention, the ROR may include a fail-safe mechanism to ensure that the software executed by the processing unit is functioning correctly. A non-limiting example of such a fail-safe mechanism is a hardware switch configured to switch the display screen off.

[0037] A variety of sensors may be installed on the panel depending on the type of information to be displayed on the panel. In one non-limiting embodiment of the present invention, the sensor is a thermometer used to determine and display the current temperature at the panel's location. In another non-limiting embodiment of the present invention, the sensor is a camera which may be used to analyse traffic patterns.

[0038] In another non-limiting embodiment of the present invention, the traffic patterns analyzed by the camera may be used to control the timing of traffic signals so as to improve the flow of traffic at a particular intersection. The processing of the traffic data may be performed at a remote location (relative to the camera) as other data for other traffic signals will be required.

[0039] Figure 2 illustrates a computer system 1201 upon which an embodiment of the present invention may be implemented. The computer system 1201 includes a bus 1202 or other communication mechanism for communicating information, and a processor 1203 coupled with the bus 1202 for processing the information. The computer system 1201 also includes a main memory 1204, such as a random access memory (RAM) or other dynamic storage device (e.g., dynamic RAM (DRAM), static RAM (SRAM), and synchronous DRAM (SDRAM)), coupled to the bus 1202 for storing information and instructions to be executed by processor 1203. In addition,

the main memory 1204 may be used for storing temporary variables or other intermediate information during the execution of instructions by the processor 1203. The computer system 1201 further includes a read only memory (ROM) 1205 or other static storage device (e.g., programmable ROM (PROM), erasable PROM (EPROM), and electrically erasable PROM (EEPROM)) coupled to the bus 1202 for storing static information and instructions for the processor 1203.

[0040] The computer system 1201 also includes a disk controller 1206 coupled to the bus 1202 to control one or more storage devices for storing information and instructions, such as a magnetic hard disk 1207, and a removable media drive 1208 (e.g., floppy disk drive, read-only compact disc drive, read/write compact disc drive, compact disc jukebox, tape drive, and removable magneto-optical drive). The storage devices may be added to the computer system 1201 using an appropriate device interface (e.g., small computer system interface (SCSI), integrated device electronics (IDE), enhanced-IDE (E-IDE), direct memory access (DMA), or ultra-DMA).

[0041] The computer system 1201 may also include special purpose logic devices (e.g., application specific integrated circuits (ASICs)) or configurable logic devices (e.g., simple programmable logic devices (SPLDs), complex programmable logic devices (CPLDs), and field programmable gate arrays (FPGAs)).

[0042] The computer system 1201 may also include a display controller 1209 coupled to the bus 1202 to control a display 1210, such as a cathode ray tube (CRT), for displaying information to a computer user. The computer system includes input devices, such as a keyboard 1211 and a pointing device 1212, for interacting with a computer user and providing information to the processor 1203. The pointing device 1212, for example, may be a mouse, a trackball, or a pointing stick for communicating direction information and command selections to the processor 1203 and for controlling cursor movement on the display 1210. In addition, a printer may provide printed listings of data stored and/or generated by the computer system 1201.

[0043] The computer system 1201 performs a portion or all of the processing steps of the invention in response to the processor 1203 executing one or more sequences of one or more instructions contained in a memory, such as the main memory 1204. Such instructions may be read into the main memory 1204 from another computer readable medium, such as a hard disk 1207 or a removable media drive 1208. One or more processors in a multi-processing arrangement may also be employed to execute the sequences of instructions contained in main memory 1204. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions. Thus, embodiments are not limited to any specific combination of hardware circuitry and software.

[0044] As stated above, the computer system 1201 includes at least one computer readable medium or mem-

ory for holding instructions programmed according to the teachings of the invention and for containing data structures, tables, records, or other data described herein. Examples of computer readable media are compact discs, hard disks, floppy disks, tape, magneto-optical disks, PROMs (EPROM, EEPROM, flash EPROM), DRAM, SRAM, SDRAM, or any other magnetic medium, compact discs (e.g., CD-ROM), or any other optical medium, punch cards, paper tape, or other physical medium with patterns of holes, a carrier wave (described below), or any other medium from which a computer can read.

[0045] Stored on any one or on a combination of computer readable media, the present invention includes software for controlling the computer system 1201, for driving a device or devices for implementing the invention, and for enabling the computer system 1201 to interact with a human user (e.g., print production personnel). Such software may include, but is not limited to, device drivers, operating systems, development tools, and applications software. Such computer readable media further includes the computer program product of the present invention for performing all or a portion (if processing is distributed) of the processing performed in implementing the invention.

[0046] The computer code devices of the present invention may be any interpretable or executable code mechanism, including but not limited to scripts, interpretable programs, dynamic link libraries (DLLs), Java classes, and complete executable programs. Moreover, parts of the processing of the present invention may be distributed for better performance, reliability, and/or cost.

[0047] The term "computer readable medium" as used herein refers to any medium that participates in providing instructions to the processor 1203 for execution. A computer readable medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. Non-volatile media includes, for example, optical, magnetic disks, and magneto-optical disks, such as the hard disk 1207 or the removable media drive 1208. Volatile media includes dynamic memory, such as the main memory 1204. Transmission media includes coaxial cables, copper wire and fiber optics, including the wires that make up the bus 1202. Transmission media also may also take the form of acoustic or light waves, such as those generated during radio wave and infrared data communications.

[0048] Various forms of computer readable media may be involved in carrying out one or more sequences of one or more instructions to processor 1203 for execution. For example, the instructions may initially be carried on a magnetic disk of a remote computer. The remote computer can load the instructions for implementing all or a portion of the present invention remotely into a dynamic memory and send the instructions over a telephone line using a modem. A modem local to the computer system 1201 may receive the data on the telephone line and use an infrared transmitter to convert the data to an infrared signal. An infrared detector coupled to the bus 1202 can

receive the data carried in the infrared signal and place the data on the bus 1202. The bus 1202 carries the data to the main memory 1204, from which the processor 1203 retrieves and executes the instructions. The instructions received by the main memory 1204 may optionally be stored on storage device 1207 or 1208 either before or after execution by processor 1203.

[0049] The computer system 1201 also includes a communication interface 1213 coupled to the bus 1202. The communication interface 1213 provides a two-way data communication coupling to a network link 1214 that is connected to, for example, a local area network (LAN) 1215, or to another communications network 1216 such as the Internet. For example, the communication interface 1213 may be a network interface card to attach to any packet switched LAN. As another example, the communication interface 1213 may be an asymmetrical digital subscriber line (ADSL) card, an integrated services digital network (ISDN) card or a modem to provide a data communication connection to a corresponding type of communications line. Wireless links may also be implemented. In any such implementation, the communication interface 1213 sends and receives electrical, electromagnetic or optical signals that carry digital data streams representing various types of information.

[0050] The network link 1214 typically provides data communication through one or more networks to other data devices. For example, the network link 1214 may provide a connection to another computer through a local network 1215 (e.g., a LAN) or through equipment operated by a service provider, which provides communication services through a communications network 1216. The local network 1214 and the communications network 1216 use, for example, electrical, electromagnetic, or optical signals that carry digital data streams, and the associated physical layer (e.g., CAT 5 cable, coaxial cable, optical fiber, etc). The signals through the various networks and the signals on the network link 1214 and through the communication interface 1213, which carry the digital data to and from the computer system 1201 maybe implemented in baseband signals, or carrier wave based signals. The baseband signals convey the digital data as unmodulated electrical pulses that are descriptive of a stream of digital data bits, where the term "bits" is to be construed broadly to mean symbol, where each symbol conveys at least one or more information bits. The digital data may also be used to modulate a carrier wave, such as with amplitude, phase and/or frequency shift keyed signals that are propagated over a conductive media, or transmitted as electromagnetic waves through a propagation medium. Thus, the digital data may be sent as unmodulated baseband data through a "wired" communication channel and/or sent within a predetermined frequency band, different than baseband, by modulating a carrier wave. The computer system 1201 can transmit and receive data, including program code, through the network(s) 1215 and 1216, the network link 1214 and the communication interface 1213. Moreover, the network

link 1214 may provide a connection through a LAN 1215 to a mobile device 1217 such as a personal digital assistant (PDA) laptop computer, or cellular telephone.

Claims

1. An apparatus for displaying information messages on a roadway, the apparatus comprising :

- display means for displaying information messages,
- control means connected to said display means for controlling the display of information messages by said display means,

the apparatus being **characterized in that** it further comprises :

- Acquisition means for acquiring an acquired signal indicating that a traffic regulation signal is either in a first state which forbids circulation of traffic or in a second state which allows circulation of traffic, and generating an output signal indicating whether said traffic signal is in the first state or the second state, and
- Synchronization means connected to the output of the acquisition means and to said control means, in order to selectively display information messages only when the traffic regulation signal is in the first state.

2. The apparatus according to the preceding claim **characterized in that** said acquired signal is a control signal input into the traffic regulation signal that controls whether the traffic regulation signal is in the first state or the second state.

3. The Apparatus according to claim 1 **characterized in that** said acquisition means are connected to an output of said traffic regulation signal and said acquired signal is directly acquired from the regulation signal.

4. The apparatus according to claim 1 **characterized in that** said connection between the acquisition means and the traffic regulation signal is a wireless connection.

5. The apparatus according to claim 1 **characterized in that** said traffic regulation signal regulates vehicle traffic.

6. The apparatus according to claim 1, **characterized in that** said traffic regulation signal regulates pedestrian traffic.

7. The apparatus according to claim 1, further compris-

ing:

Information message determining means determining the information message to be displayed and communicating the information message to be displayed to the control means, said control means causing the display means to display the information message.

8. The apparatus according to claim 7, **characterized in that** said information message determining means receives information from sensors, and based on this information selects a predetermined information message from a memory means.

9. The apparatus according to claim 7, **characterized in that** said information message determining means receives the information message to be displayed from a remote source.

10. A method for displaying information messages on a roadway on an apparatus comprising :

- display means for displaying information messages,
- control means connected to said display means for controlling the display of information messages by said display means,

the method being **characterized in that** it comprises the steps of:

- acquiring a signal indicating that a traffic regulation signal is either in a first state which forbids circulation of traffic or in a second state which allows circulation of traffic,
- generating an output signal indicating whether said traffic signal is in the first state or the second state, and
- Synchronizing the output signal and control means of the apparatus,
- selectively displaying information messages only when the traffic regulation signal is in the first state.

11. Method according to claim 10 **characterized in that** said acquired signal is a control signal input into the traffic regulation signal that controls whether the traffic regulation signal is in the first state or the second state.

12. Method according to claim 10 **characterized in that** said acquisition means are connected to an output of said traffic regulation signal and said acquired signal is directly acquired from the regulation signal.

13. Method according to claim 10 **characterized in that** said connection between the acquisition means and

the traffic regulation signal is a wireless connection.

14. Method according to claim 10 **characterized in that** said traffic regulation signal regulates vehicle traffic.

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15. Method according to claim 10, **characterized in that** said traffic regulation signal regulates pedestrian traffic.

16. Method according to claim 10, further comprising the step of : determining the information message to be displayed by an information message determining means and communicating the information message to be displayed to the control means, said control means causing the display means to display the information message.

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17. Method according to claim 16, **characterized in that** said information message determining means receives information from sensors, and based on this information selects a predetermined information message from a memory means.

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18. Method according to claim 16, **characterized in that** said information message determining means receives the information message to be displayed from a remote source.

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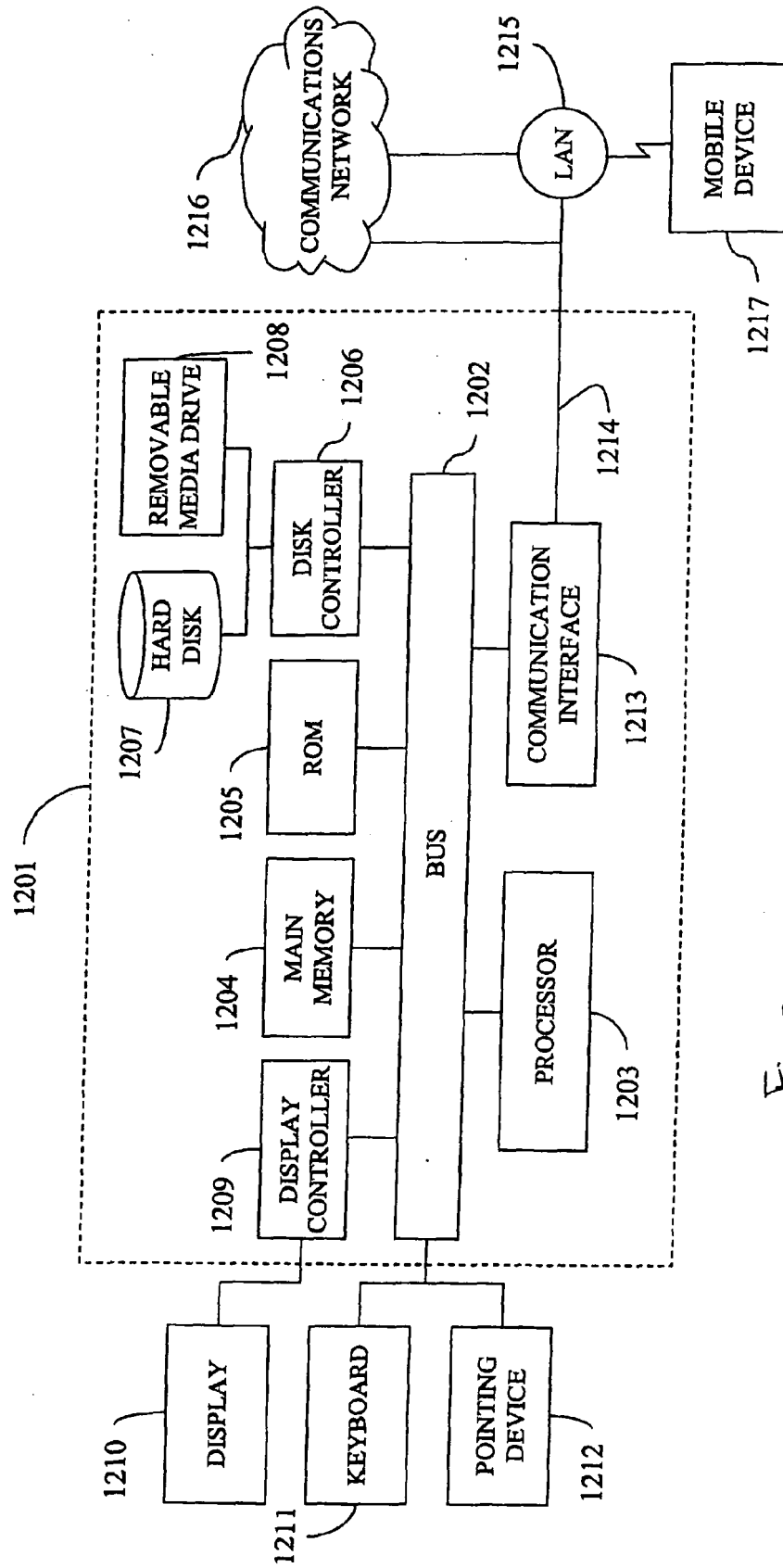


Fig. 2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 29 1878

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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