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(54) **Security indication system**

(57) A security status indication system for a closure, wherein the closure has a locking member which is selectively actuatable into and from a locking condition, and the system comprises a sensor arranged to detect a change in condition of the locking member and a transmitter which, upon detection of said change in condition of the locking member, transmits a signal to a portable device. The portable device comprises user input means

and a display screen, wherein the device is arranged to store a security status condition for said closure according to the most recently received signal from the transmitter such that upon operation of the user input means by a user, the device indicates the security status of the closure on said display screen according to the most recently stored security status indication.

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## Description

**[0001]** The present invention relates to a security indication system and more specifically to a system which informs a user of a security status remotely.

**[0002]** When a closure is regularly locked and unlocked by a user, the most recent instance at which the closure was last locked or unlocked can easily be forgotten or confused with an alternate instance. This leaves the user in some doubt as to the security status of the closure. If the user is in the close vicinity of the closure, it would be a minor inconvenience to return to the closure in order to manually check whether the closure was left in a locked or unlocked condition. However if the user is further afield, the problem is heightened since the user cannot readily check the security status and the user is left with the uncertainty as to whether the closure is correctly secured.

**[0003]** Whilst the description proceeds in relation to a locking system for a road vehicle, the present invention is applicable to locking systems for a variety of alternative uses, such as, for example, doors and windows for other types of vehicle, closures for buildings, gates, grates, safe doors and the like.

**[0004]** The problem of leaving vehicle doors unlocked has been identified and a number of solutions proposed. One known solution involves the provision of an automatic locking system which locks the car doors once a predetermined period of inactivity has elapsed after a door has been closed.

**[0005]** However such systems are inherently complicated since they must take into account multiple scenarios, in order to avoid unwanted locking of the vehicle, such as, for example, when there is an occupant within the vehicle, or else when the keys are left inside. Therefore multiple sensors are required to detect such conditions and the operation of the system as a whole is dependent on multiple components, the failure of any one of which could prevent correct locking of the vehicle.

**[0006]** Furthermore, such automatic locking systems generally require the doors to be correctly closed before locking can occur. Thus if a user does not correctly close the door, automated locking will not occur. In recognition of this problem, some vehicles are provided with a motorised door closing mechanisms, although this is generally recognized as a costly solution to the problem.

**[0007]** A more widely accepted solution involves the provision of an indication system such as an audible alarm or else operation of the vehicle lights to indicate when the vehicle doors are not correctly locked by the user. However such indication systems are configured to detect a failed locking attempt and do not provide indication when the user has entirely forgotten to lock the car.

**[0008]** In the case of flashing vehicle lights, the user can easily fail to notice the indication when their back is turned, for example when walking away from the vehicle. Once the vehicle is out of the users sight or earshot the

security status indication provided by the vehicle is ineffectual. In such an instance, the indication in fact is detrimental to the security of the vehicle since it can be seen or heard by anyone else in the vicinity of the vehicle. Thus by attempting to alert the user of the vehicle security status, a number of other people are potentially informed if the vehicle is left unlocked.

**[0009]** A number of vehicles have a combination of automated locking systems and security indication systems as described above, which further increases the number of potential combinations of inputs which need to be catered for by the vehicle processor.

**[0010]** In view of the foregoing problems, the present invention aims to provide a security system, which can provide a security indication to a user in a more effective and secure manner.

**[0011]** According to the present invention, there is provided a security status indication system for a closure, wherein the closure has a locking member which is selectively actuatable into and from a locking condition, and the system comprises: a sensor arranged to detect a change in condition of the locking member; and a transmitter which, upon detection of said change in condition of the locking member, transmits a signal to a portable electronic device; wherein the device has display means arranged selectively to indicate a security status for the closure in dependence on the last received signal from the transmitter.

**[0012]** The present invention is particularly advantageous since the security status is transmitted to a portable device which is in the possession of a user. Thus the user can check whether or not their vehicle is locked regardless of their location relative to the vehicle. In addition, the provision of the security status indication on a portable device prevents the indication being viewed or heard by people in the vicinity of the vehicle. In contrast, conventional systems aim to solve the problem by the provision of alarms and automated locking devices, whereas the present invention approaches the problem from a different perspective by provision of a discrete and secure indication to the user.

**[0013]** The indication may be visual and/or auditory and, in one embodiment, different colours are provided to indicate a locked or unlocked condition. According to one embodiment, the indication includes notification of the time and/or date on which the last security status indication signal was received by the device.

**[0014]** The use of a display screen as opposed to LED's or other conventional keyfob-type devices is that additional information can be stored and displayed to a user, such as time/date information and/or any combination of the make, model or registration of the vehicle. Thus the device can be used for a number of different vehicles in a manner which is not permitted by conventional keyfobs, which are dedicated to a single vehicle. The use of the device in this manner is permitted by the requirement for a user to enter security criteria in order to be able to access the security indication for a particular

vehicle.

**[0015]** In one preferred embodiment, the selected security status indication is stored by the device but is not indicated until operation of the device by a user. The device may store a series of status indications such that a user can access the sequence of locking and/or unlocking operations preceding the most recent security status. The earlier stored status indications may have an associated time and/or date stored against that record which can be displayed to the user. This helps a user to verify that the current status is as intended by checking earlier operations.

**[0016]** Preferably the sensor detects a movement and/or a position of the locking member. The direct detection of the condition of the locking member is advantageous since only a single condition is required to determine whether or not the door is locked. This is in contrast to conventional systems which typically detect whether a keyfob and/or other mechanical or electronic means related to the operation of the locking member have been operated. The locking condition information is then fed to a processor which determines the security status of the vehicle and takes appropriate steps. The present invention is greatly simplified and can provide an indication of the locked status of the closure without the need for complicated processing steps. Thus the present invention need only recognize a positive or a negative locking condition, akin to a binary system.

**[0017]** According to one embodiment, the transmitter may be configured to transmit a first signal relating to a locking condition and a second signal relating to an unlocked condition. The device may comprise control means which selects between first and second security indications for display on the device according to the receipt of respective first or second signals. Thus a change in selection of the security indication is only effected by the control means if the received signal does not match the previously selected security indication. Thus the previously selected security indication remains selected or stored until a contrary signal is received.

**[0018]** In one embodiment the transmitter emits the signal over a predetermined distance or radius. Preferably the transmitter repeatedly transmits the signal for a predetermined time period after the change in condition of the locking member is detected. Typically the transmitter communicates directly with device

**[0019]** Thus when the device is within a predetermined distance of the transmitter it receives the signal. When the device is taken outside the emission zone of the transmitter, the security indication selection cannot be changed. The invention therefore takes advantage of the fact that a user must be in the vicinity of a vehicle when locking or unlocking the vehicle, and thus the security status of the car is only monitored over an appropriate signal range. Once the device has received a signal confirming the security status, the status is effectively stored and the device does not need to transmit or receive further signals upon a request to review the security status

by the user.

**[0020]** Preferably, the security indication is protected in order to prevent an authorised viewing of the security indication. Typically a password or code is required to be input by the user to access the security indication. The security indication may only be displayed when a button or other user input means is actuated by the user. The security status of the closure may only be displayed whilst a button or key is depressed and may disappear when that button or key is released.

**[0021]** In one embodiment, wireless communication between the device and the transmitter is effected by Bluetooth. Thus the device and emitter must be paired in order to ensure that the signal can be received, further increasing security.

**[0022]** The range of the security status signal transmitter can be matched to the range of the device.

**[0023]** According to a further aspect of the present invention, there is provided a portable electronic device for the selective display of a security indication for a closure in a remote location, the device having a receiver and control means, the receiver being arranged to receive a signal from a transmitter within a predetermined range, the signal relating to a security status of a closure, and wherein the control means selects a security indication relating to the security status upon receipt of the signal, the selected security indication being retrievable by a user upon operation of the device.

**[0024]** Typically the security indication selection is stored by the control means for subsequent retrieval by the user until a contrary signal is received by the device.

**[0025]** Preferred embodiments of the invention will now be described with reference to the following figures, of which:

Figure 1 shows a flow diagram of a system according to the present invention;

Figure 2 shows a portable device according to a first embodiment of the present invention; and,

Figures 3a-e show the output display of a portable device according to one embodiment of the present invention during different stages of use;

**[0026]** Closure locks and, in particular, car door locks typically comprise a lock mechanism operable by a handle on the outside of the door. A locking member in the form of a latch is provided between the handle and the lock mechanism. The latch is movable into and from the force path between the handle and lock mechanism. Thus when the latch is removed from the force path, the lock mechanism cannot be operated by the handle and the door is locked. Conversely, when the latch connects the door and handle, the door can be opened in the normal manner. To this end, the latch is movable into and from a locking condition by an actuator. Actuators of this kind are typically electric motors, which are operated by

an electric signal to drive the latch a predetermined distance, for example by way of a rack and pinion mechanism.

**[0027]** Further details of conventional car door locks are omitted since various locking arrangements are available, the basic principles of which are well known to a person skilled in the art.

**[0028]** Turning now to figure 1, there is shown a flow diagram for the interaction between the various components of the system according to the present invention.

**[0029]** Detection means in the form of a sensor 10 is provided to determine whether a closure is locked. The sensor may comprise a contact or pressure sensor although a number of conventional sensors are available for detecting the position and/or movement of a locking member as would be understood by a person skilled in the art. In this regard the sensor is mounted relative to the latch so as to detect when the latch achieves a predetermined position. Alternatively the sensor may detect operation of the actuator and may be integral with the actuator itself.

**[0030]** In view of central locking systems, it is often only necessary to detect the status of the driver door latch in order to provide a security indication for a vehicle.

**[0031]** The sensor transmits a signal to the vehicle processor 12 indicative of a change of condition of the latch. The processor is connected to voltage regulator 14 which provides an appropriate voltage for operation. Upon receipt of the signal from the sensor, the processor 12 operates Bluetooth (RTM) transceiver 16 to emit a signal 17, which can be received by an electronic device 18 within the vicinity of the transceiver. The device 18 takes the form of a portable electronic device such as a conventional portable telephone, PDA or the like. The body of the signal need only provide a single unit of data to indicate a locked or unlocked state, such as in terms of a 1 or 0.

**[0032]** Bluetooth (RTM) technology has been found to be particularly well suited to use in accordance with the present invention since a cost effective transceiver can be employed using binary frequency modulation and frequency hopping overcomes interference problems. Whilst a number of devices can be synchronised with the transceiver, the devices must first be paired to the transceiver in order to share data. In addition each device must be programmed to recognise and process the data in order to indicate to a user the significance thereof.

**[0033]** Once the device has been paired, it will be appreciated that the device receives the data signal passively. Thus only one-way communication between the transceiver and the device is required for normal operation.

**[0034]** It will be appreciated that other transceivers could be used to similar effect provided that the device 18 is programmed to be synchronised with the transceiver and that unauthorised devices are excluded. In addition it is possible that a single device could be paired with a number of transmitters such that a user can monitor

the status of a number of vehicles or other types of closure. Once paired, the device can differentiate between the different vehicles based upon the packet data transmitted by the different transmitters for each vehicle. The data transmitted by the vehicle transmitter typically comprises a name or code which is recognisable to the user as an indication of that vehicle.

**[0035]** Turning now to figure 2, the device 18 has an antenna 20 by which the signal is received. The device 18 has control means 22 including a receiver. The control means 22 comprises a programmable chip or processor which is provided with instructions to log the received signal 17. In this regards the device is typically programmed to recognise a variable, which is indicative of the locked or unlocked state of the closure. Thus upon receipt of the signal, the signal data is compared to the stored variable and the variable is amended if necessary.

**[0036]** Alternatively the device 18 may comprise a switch for selecting between security status indications to be displayed, the received signal corresponding to a particular switch position.

**[0037]** In another less advantageous embodiment, the transmitter may transmit only a first signal, regardless of the locking condition such that the control means toggles the security indication to be displayed to the user each time a signal is received. Thus the transmitter may transmit only a single signal each time the locking condition changes.

**[0038]** The control means 22 is connected to indication means 24 and memory 26. The indication means comprises a screen 28 (see fig 3) but may additionally comprise one or more LEDs or else a speaker, buzzer or vibration means.

**[0039]** When a signal is received from a vehicle, the control means can analyse the signal data to determine whether the signal relates to a vehicle transmitter which has been registered or paired with the user device. In the event that the vehicle transmitter is recognised, the device stores the security status as well as the time and date of the receipt of the signal in memory 26 against a record for that vehicle. The memory may store a predetermined number of security status entries for that vehicle, such as, for example, ten or twenty entries.

**[0040]** The control means 22 is programmed to run a program, which, in the embodiment described in relation to figure 3, is coded using Java (RTM). In particular the program may be embodied as a combination of graphical user interfaces with associated code in the form of a Java applet. Thus the program is simple to install on existing Bluetooth enabled electronic devices and does not require any reconfiguration of the device.

**[0041]** The use of the device 18 and system is described below in relation to figure 3. When a user locks a closure having a sensor 10 and transmitter 16 as shown in figure 1, the signal is received by the device 18 and the record of the security status of the closure is automatically updated in the device memory 26. Whether the user is inside or outside of the range of the transmitter

or transceiver 16, the user can still access the last stored security status for the closure by accessing the program on the device 18 as described below:

In figure 3a, the display screen 28 displays the available programs on the device 18. The user selects the application relating to the security status indication system according to the present invention using conventional input means such as keys, a touchscreen or the like.

In figure 3b the application starts up, for which the name "iLOCK" has been coined by the Applicant, and the welcome screen is displayed confirming the user's selection.

In figure 3c the user can select from one or more vehicle indications 30 for vehicles which have been preregistered on the device. In this regard, once a device has been paired with a particular transceiver, the device stores data relating to the transceiver in the device memory for ease of selection at a later time.

**[0042]** When the transmitter 16 transmits the signal to the device, the vehicle ID may be coded and may take the form of a name or other string such that it does not clearly identify the vehicle to a third party. When the signal is received by the device, it may associate the transmitted code or name with the stored vehicle details such that the vehicle registration and the like is only displayed to the user of the handset and is not transmitted freely for third parties to view using other electronic devices.

**[0043]** In figure 3d the user is requested to enter a PIN number or other form of identification in order to ensure that the security status of the vehicle is not disseminated to anyone but the user. It will be appreciated that the PIN identification stage may occur prior to the vehicle selection in figure 3c in order to ensure that the vehicle details are unobtainable to an unauthorized user. The vehicle details and PIN may also be protected within the memory, for example by encryption or other means, such that they cannot be retrieved by other programs.

**[0044]** After the user has been authorized, the device displays the security status indication 32 for the selected vehicle including the time and date at which the most recent signal, relating to the displayed security status, was received. Alternatively the device may store and display a time and date supplied by the transmitter within the security status data signal, representative of the time at which the locking or unlocking of the car occurred.

**[0045]** The 'locked' and 'unlocked' displays are shown in figure 3e, which relate to first and second security conditions. Typically the security status is displayed for a predetermined time period such as, for example, a few seconds, after which the program returns to the selection screen, the PIN entry screen, or else is automatically closed.

**[0046]** In another embodiment, the security indication is only displayed whilst a user holds down a key, button or touches a touchscreen. Thus as soon as the user releases the user input means, the security status may disappear and the programs may return to an earlier selection screen PIN entry screen or close.

**[0047]** In one embodiment, the user may be able to scroll up or down to one or more previously stored security status entries, which may also show the time and date of those entries. Thus the user can view a limited history of the operation of the closure. The previous entries may be displayed as a list or else each entry may fill the screen such that the display changes for each entry. The device may also store a list of locking or unlocking attempts made and indication as to whether those attempts were successful or unsuccessful. Such data may be transmitted by the transmitter based upon locking signals received for which the sensor detected the change of condition of the lock or not.

**[0048]** The present invention may be integrated into a vehicles existing circuitry such that the vehicle CPU controls the transmission of the signal to the device via existing transmission means. Alternatively the sensor and transmission circuit may be provided as a stand-alone circuit or component to be retro-fitted to an existing vehicle without making use of the vehicle CPU functionality.

**[0049]** Whilst the present invention is particularly suited to use by way of mobile telephones, cell phones, PDA's, or the like, it is also possible to implement the invention using other portable communication apparatus having a display screen which are capable of receiving and logging data signals. Such devices may comprise keyfobs or the like. The present invention is advantageous in that it does not necessarily require the use of a dedicated device and the relevant code may be implemented on any number of devices due to its relatively small file size.

**[0050]** The present invention may also be applied to other types of closure and is limited only by the requirement that the closure has a locking member which can be actuated between a locking and unlocked condition, the condition of which can be detected by a sensor.

**[0051]** The device may also be capable of communication with a PC having corresponding software installed thereon, such that the security status of the vehicle is accessible by the user via the PC.

## Claims

1. A security status indication system for a closure, wherein the closure has a locking member which is selectively actuatable into and from a locking condition, and the system comprises:

- a sensor arranged to detect a change in condition of the locking member;
- a transmitter which, upon detection of said

- change in condition of the locking member, transmits a signal to a portable device, the portable device comprising user input means and a display screen, wherein the device is arranged to store a security status condition for said closure according to the most recently received signal from the transmitter such that upon operation of the user input means by a user, the device indicates the security status of the closure on said display screen according to the most recently stored security status indication.
2. A security status indication system according to claim 1, wherein the portable device comprises a memory, in which a record of the security status condition for one or more vehicles is stored along with a time and/or date for said security status, said time and/or date being displayed to said user upon operation of said user input means.
  3. A security status indication system according to claim 1 or claim 2, wherein the portable device comprises a memory, in which a record of the security status condition for one or more vehicles is stored along with vehicle identification information, the device being arranged to display said vehicle identification information to said user upon operation of said user input means.
  4. A security status indication system according to any claim 2 or 3, wherein any of the time, date and/or vehicle identification information are displayed with said security status indication.
  5. A security status indication system according to any previous claim, wherein a plurality of security status conditions are stored for a vehicle, said security status conditions being selectively retrievable for display on said display screen.
  6. A security status indication system according to claim 6, wherein the security status according to the last received signal is logged in place of any previously logged security status.
  7. A security status indication system according to any preceding claim, wherein the device prompts the user to input a security code prior to enabling the display of said security status.
  8. A security status indication system according to any preceding claim, wherein the sensor detects a movement and/or a position of the locking member.
  9. A security status indication system according to any preceding claim, wherein the device comprises control means which selects between first and second security status conditions according to the received signal.
  10. A security status indication system according to any preceding claim, wherein the transmitter is configured to transmit a first signal relating to a locking condition and a second signal relating to an unlocked condition.
  11. A security status indication system according to any preceding claim, wherein the transmitter repeatedly transmits the signal for a predetermined time period after the change in condition of the locking member is detected.
  12. A security status indication system according to any preceding claim, wherein the transmitter and the portable device are synchronized.
  13. A portable electrical device for the selective indication of a security status for a closure in a remote location, the device having;
    - a receiver arranged to receive a wireless signal relating to a security status of a closure;
    - control means arranged to store a security condition indicative of the closure security status upon receipt of the signal;
    - user input means and,
    - a display screen,
    - wherein the device is arranged to store a security status condition for said closure according to the most recently received security signal for said closure such that upon operation of the user input means by a user, the device indicates the security status of the closure on said display screen according to the most recently stored security status indication.

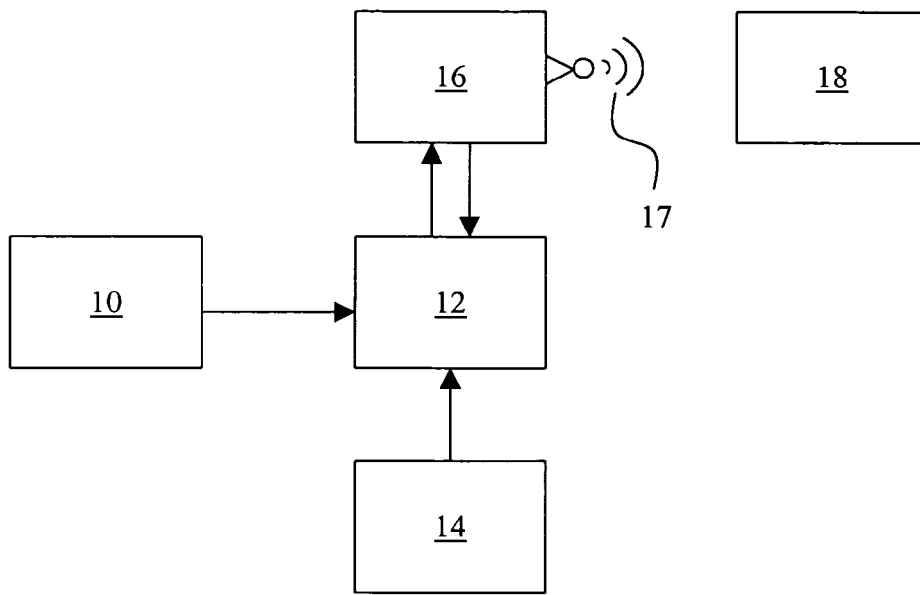


Fig. 1

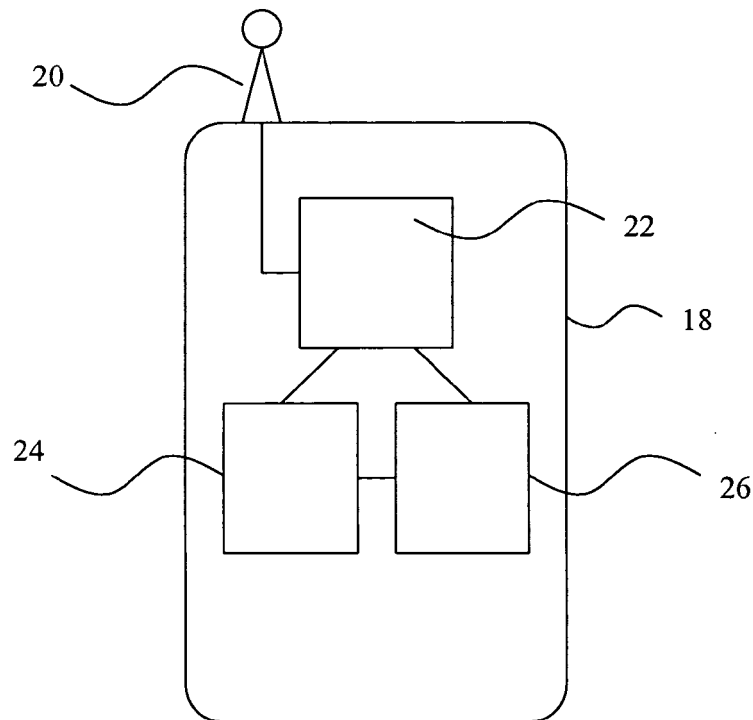


Fig. 2

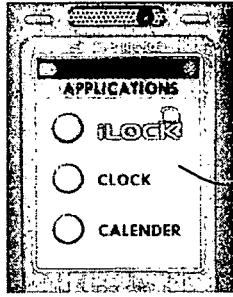


Fig 3a

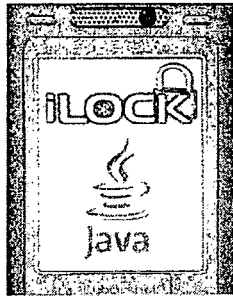


Fig 3b

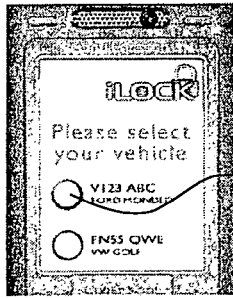


Fig 3c



Fig 3d

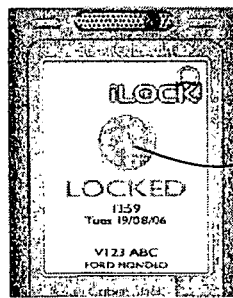


Fig 3e

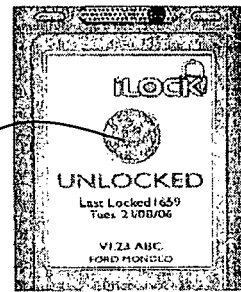


Fig 3f