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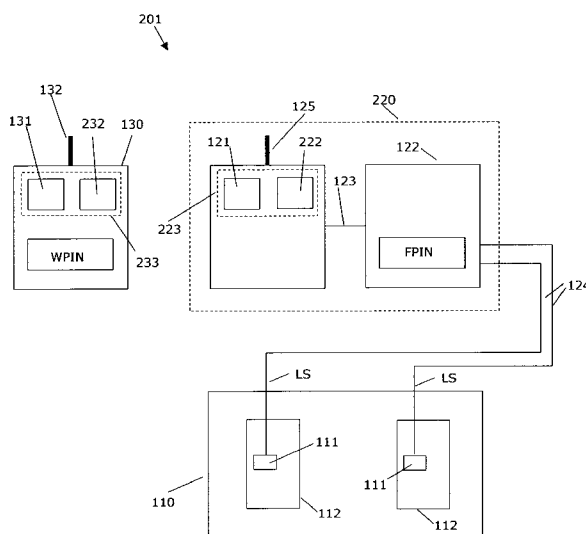
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(54) **Title:** LOCKING SYSTEM AND REMOTE-CONTROLLED ENTRY SYSTEM



(57) **Abstract:** The present invention relates to a method for operating a remote-controlled entry system (201). The remote-controlled entry system contains at least one lock (111) capable of being switched between a locked state and an un-locked state, where each lock is capable of locking a door (112) a stationary entity (110), such as a vehicle. The entry system further contains a wireless electronic device (130) having a wireless transceiver (233), and a stationary detection system (120,220), which contains a fixed transceiver (223), where the fixed transceiver (223) is capable communicating with the wireless transceiver (233). By use of the analysing unit 122, the remote-controlled entry system is capable of switching locking states of a lock (111) by changes of the distance between the stationary detection system (220) and a user carrying a wireless electronic device (130). The wireless electronic device may for instance be a mobile phone.

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LOCKING SYSTEM AND REMOTE-CONTROLLED ENTRY SYSTEM

FIELD OF THE INVENTION

The present invention relates to a locking system and a remote-controlled entry
5 system.

BACKGROUND OF THE INVENTION

Remote-controlled entry systems enable users to unlock or lock a door, such as a
door of a vehicle, from a distance of the vehicle. Such remote-controlled entry
10 systems comprise a transmitter unit carried by the user which is capable of
communicating with a lock-control system placed in the vehicle by means of
electro-magnetic waves. The transmitter unit is often provided with separate
bottoms for locking and un-locking.

15 In order to lock or un-lock the vehicle the user has to pull out the transmitter unit
from a pocket and push the correct bottom for e.g. un-locking the vehicle. In a
situation where the user uses both hands for carrying shopping bags the user is
placed in a very inconvenient situation since the user needs to place the shopping
bags on the ground in order to operate the transmitter unit. In addition, the user
20 may find it inconvenient to have to carry the transmitter in a pocket together with
other personal accessories.

It is known that signals being transmitted from the transmitter unit for un-locking
the vehicle can be recorded by unauthorised persons who uses the recorded
25 information for unauthorised access to the vehicle.

US 6,236,333 discloses a passive remote keyless entry system that includes a
plurality of sensors each associated with a door of the vehicle. Each sensor
detects the presence and distance of a key fob from the sensor. The key fob may
30 be understood as a hardware device with built-in authentication systems. By
monitoring the distance of the key fob from the sensor, the sensor determines if
the key fob is approaching or moving away from the associated door. If the
sensor determines that the key fob is approaching, an interrogation signal is sent
from the security system to the key fob. If the proper code is returned by the key
35 fob, the associated door is unlocked. If the sensor determines that the key fob is

moving away from the associated door, the doors are locked. The sensors can also determine whether the key fob is simply passing by, in which case the driver probably does not wish to enter the vehicle. US 6,236,333 does not provide a solution to avoid carrying the transmitter in a pocket together with other personal accessories.

Hence, an improved optical remote-controlled entry system would be advantageous, and in particular a more flexible, user friendly and secure remote-controlled entry system would be advantageous.

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SUMMARY OF THE INVENTION

Accordingly, the invention preferably seeks to mitigate, alleviate or eliminate one or more of the above mentioned disadvantages singly or in any combination. In particular, it may be seen as an object of the present invention to provide a method for a remote-controlled entry system that uses a wireless electronic device which is already used by the user for other purposes, so that the method solves the above mentioned problems of the prior art which requires the user to carry the transmitter in a pocket together with other personal accessories.

20

This object and several other objects are obtained in a first aspect of the invention by providing a method for operating a remote-controlled entry system, said remote-controlled entry system comprising

- 25 - at least one lock capable of being switched between locking states comprising a locked state and an un-locked state, where each of the at least one lock is capable of locking a door of at least one stationary entity,
- at least one wireless electronic device each comprising a wireless transmitter or a wireless transceiver, and
- 30 - at least one stationary detection system, each comprising
- a fixed receiver or fixed transceiver, where the fixed receiver or the fixed transceiver is capable of receiving a signal being transmitted from the wireless transmitter or the wireless transceiver, and where the fixed transceiver is capable of transmitting a signal to the wireless transceiver, and

- an analysing unit being capable of determining a signal parameter from the signal received by the fixed receiver or the fixed transceiver, said signal parameter being indicative of a distance between one of the at least one wireless electronic device and one of the at least one stationary detection system, and said
5 analysing unit being in connection with the fixed receiver or the fixed transceiver and the at least one lock, wherein

- the switching between locking states of the at least one lock is enabled by changes of the distance between one of the at least one stationary detection
10 system and a user carrying one of the at least one wireless electronic device, and

- the wireless electronic device has at least first and second functions, said first function is related to a primary use of the wireless electronic device, and said second function is transmission of a signal for remote-controlled switching the
15 locking states of the at least one lock.

The invention is particularly, but not exclusively, advantageous for enabling remote-controlled locking and unlocking a door in an entity, for example a door in a vehicle, by switching the locking states of a lock associated with the door. In
20 particular, the method according to the present invention enables a user to use a wireless electronic device, for example a mobile phone, for switching locking states of one or more locks.

It is an advantage that a mobile phone can be used in a remote-controlled entry
25 system since then the user does not have to carry other devices for locking or unlocking a door of a vehicle.

It may be another advantage that a plurality of for instance mobile phones can be used in a remote-controlled entry system since this enables different users
30 carrying wireless electronic devices to get access to a vehicle since each user is able to switch locking states of a lock of the vehicle.

An advantage may be that, by the use of a single wireless electronic device a user may be capable of locking and unlocking doors of different entities, for instance
35 the user may be capable of switching locking states of locks in both a car, a

private house, a workplace and offices and rooms of the workplace by the use of the same wireless electronic device or mobile phone.

It may be an advantage that different types of wireless electronic devices can be used for switching locking states. For instance wireless electronic devices having first functions related to a primary use of telecommunication, computing, e-mailing and personal digital administration may be used for the remote-controlled entry system.

10 The switching between locking states of the at least one lock is enabled by changes in the distance between one of the at least one stationary detection system and a user carrying one of the at least one wireless electronic device. Thus, merely by approaching or moving away from a vehicle having a stationary detection system, the user carrying a wireless electronic device is able to switch locking states of locks. Accordingly, the user may not need to operate the wireless electronic device, for instance by pushing a button, in order to switch locking states.

An analysing unit of the remote-controlled entry system may determine a distance between a stationary detection system and a user carrying a wireless electronic device by determining a signal parameter from the signal received by the fixed receiver or the fixed transceiver. The signal parameter may be indicative of a distance between a wireless electronic device and a detection system. Thus, the signal parameter may be equal to the distance, the signal parameter may correspond to the distance, the signal parameter may give an indication of the distance or the signal parameter may be proportional to the distance.

Clearly, a plurality of signal parameters may be determined from a plurality of signals received by the fixed receiver or a plurality of signal parameters may be determined from a single signal. A single parameter may be determined as an average of a plurality of signal parameters which may provide a more accurate indication of a distance between a stationary detection system and a user carrying a wireless electronic device.

Accordingly, the locking state of the at least one lock may be determined from a single signal parameter or a plurality of signal parameters.

The method for remote-controlled switching locking states may additionally or

5 alternatively comprise the steps of:

- transmitting a signal from the wireless transmitter or the wireless transceiver of one of the at least one wireless electronic devices,
- receiving the signal transmitted from the wireless transmitter or the wireless transceiver by the fixed receiver or the fixed transceiver,
- 10 - determining the signal parameter from the signal, received by the fixed receiver or the fixed transceiver, by processing the signal in the analysing unit, and
- analysing the signal parameter for determining if switching the locking state of the at least one lock should be enabled.

15 Thus, it may be an advantage that the signal may be transmitted from a transmitter or a transceiver and the transmitted signal may be received by a receiver or a transceiver. A transceiver should be understood as a device comprising both a transmitter and a receiver. The signal parameter may be determined from one received signal or a plurality of received signals by

20 processing the signal or signals in an analysing unit. The processing may be performed by digital processing means or analogue processing means. For instance the digital processing may be carried out on a central processing unit by an algorithm for calculating one or more amplitudes of the one or more received signals. The one or amplitudes may also be determined by using analogue circuits,

25 for instance an analogue signal peak detection circuit, or an analogue integrating circuit.

The method for remote-controlled switching locking states may additionally or alternatively comprise the steps of:

- 30 - transmitting a signal from the fixed transceiver of one of the at least one stationary detection system,
- receiving the signal transmitted from the fixed transceiver by the wireless transceiver of one of the at least one wireless electronic devices,
- determining the signal parameter from the signal, received by the wireless
- 35 transceiver, by processing the signal in the wireless electronic device, and

- analysing the signal parameter for determining if switching the locking state of the at least one lock should be enabled,
- transmitting an enabling signal from the wireless transmitter or wireless transceiver of one of the at least one wireless electronic device to the fixed receiver or the fixed transceiver, where the enabling signal indicates that switching the locking state of the at least one lock should be enabled.

It may be an advantage that the wireless electronic device is capable of determining the signal parameter instead of the analysing unit. Thus, the wireless electronic device may analyse the signal parameter for determining if the locking states should be switched. If the locking states should be switched the wireless electronic may send an enabling signal to the fixed receiver or the fixed transceiver of the stationary detection system so as to inform the analysing unit or the stationary detection system that switching the locking states should be enabled, or alternatively if the locking states should be switched immediately.

The method for remote-controlled switching locking states may additionally or alternatively comprise the steps of:

- interrogating the stationary detection system by transmitting an interrogation signal from the wireless transmitter of one of the at least one wireless electronic devices
- authorising the wireless electronic device by comparing a code (WPIN) stored in a memory of the wireless electronic device with a code (FPIN) stored in a memory of the analysing unit.

25

It may be an advantage that the stationary detection system is capable of being awoken or interrogated from a sleep-mode by transmitting an interrogation signal or wake-up signal to the fixed receiver. Accordingly, the stationary detection system may be in sleep-mode in order to minimise consumption of electric power during a period when the stationary detection system is not expected to switch locking states or when the distance between the wireless electronic device and the stationary detection system is greater than a threshold distance. Accordingly, a threshold distance corresponding to a threshold amplitude of a received signal may be used as a measure for transmitting an interrogation signal.

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The fixed receiver or the fixed transceiver may have at least first and second functions, said first function may be related to a primary use of the fixed receiver or the fixed transceiver, and said second function may be receiving the signal from the wireless electronic device for remote-controlled switching the locking
5 states of the at least one lock.

It may be an advantage that the fixed receiver or fixed transceiver may have at least first and second functions. A fixed transceiver may be preinstalled in for instance a car for the purpose of a primary use of first functions of
10 telecommunication, data communication, authorisation, e-mailing or personal digital administration. The same preinstalled fixed transceiver may also be used for a second function of receiving the signal from the wireless electronic device for remote-controlled switching the locking states.

15 Similarly, the at least one analysing unit may have at least first and second functions, said first function is related to a primary use of the analysing unit, and said second function is analysing data being transmitted from the wireless electronic device for remote-controlled switching the locking states of the at least one lock.

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Accordingly, the analysing unit may be preinstalled in for instance a car for the purpose of a primary use of first functions of telecommunication, data communication, authorisation, e-mailing or personal digital administration. The same preinstalled analysing unit may also be used for a second function of
25 analysing data being transmitted from the wireless electronic device for remote-controlled switching the locking states.

Thus, the fixed receiver or the fixed transceiver may be preinstalled in at least one of the stationary entities for the purpose of the first function related to a
30 primary use of the fixed receiver or the fixed transceiver and, alternatively or additionally, the analysing unit may be preinstalled in at least one of the stationary entities for the purpose of the first function related to a primary use of the analysing unit.

The at least one wireless electronic device may be comprised in the group of a mobile phone, a personal digital assistant (PDA), a watch, a computer, a head-set and a bracelet transmitter.

5 It is an advantage that different wireless devices, for example a mobile phone, may be used as the wireless electric device since this allows the user to choose a preferred wireless device. Clearly, the wireless electronic device may also be selected from other wireless devices that are not mentioned here. Accordingly, the wireless electronic device could also be a Bluetooth transmitter of a bracelet,
10 where the bracelet is primarily used for authorising a person for activities or entries in relation to hotels, festivals and amusement parks.

The at least one stationary entity may be comprised in the group of vehicles, boots, buildings and rooms; at least one fixed receiver or at least one fixed
15 transceiver may be fixed to each of the at least one stationary entity; at least one analysing unit may be fixed to each of the at least one stationary entity; and the at least one wireless electronic device may be capable of remote-controlled switching the locking states of the at least one lock fixed to each of the at least one stationary entity by transmitting a signal to the at least one fixed receiver or the
20 at least one fixed transceiver.

It may be an advantage that the remote-controlled entry system may be capable of switching locking states of locks associated with a plurality of different entities comprising vehicles, boots, buildings and rooms when at least one fixed
25 transceiver and at least one analysing unit are fixed or built into each entity. It should be understood that, as an alternative, that the stationary entity may comprise a plurality of stationary detection systems, where each stationary detection system comprises a plurality of at least one fixed receiver or at least one fixed transceiver. It may be an advantage to have a plurality of fixed
30 transceivers or fixed receivers associated with a single stationary entity or a single stationary detection system, for instance for improving the wireless transmission and receiving capabilities.

The signal parameter may be determined from one or more signal amplitudes.
35 The signal received by the fixed receiver or fixed transceiver may be characterised

by a signal amplitude, for instance a voltage peak amplitude, an RMS amplitude or a DC level of a sinusoidal signal. Also the signal received by the fixed receiver or fixed transceiver may be characterised by a signal strength, a time averaged signal strength. Still other measures of signal, for instance power, may be used
5 for characterising the signal strength or signal amplitude.

It may be an advantage that the signal parameter may be determined from one or more signal amplitudes since the signal transmitted from the wireless transmitter may consists or a plurality of signals separated in time or frequency. That is, a
10 plurality of signals may be transmitted over a period of time where one signal is separated from the subsequent signal by a time interval. Also a plurality of signal may be transmitted simultaneously where each signal has a unique frequency, carrier frequency or modulation frequency. Also a plurality of signals, each having different frequencies of carrier frequency or modulation frequency, may be
15 transmitted using a multiplexing method such as a Bluetooth protocol.

The signal parameter may be determined from a phase difference of the signal transmitted from the wireless transmitter and the signal received by the fixed receiver.
20

Similarly, the signal parameter may be determined from a phase difference of the signal transmitted from the fixed transceiver and the signal received by the wireless transceiver.

25 It is an advantage that the phase difference between the transmitted and the received signal may be used for determining the signal parameter since the phase difference may provide a more precise measure of the distance between the wireless electronic device and the stationary detection system. Accordingly, both the wireless electronic device and the analysing unit may be used for determining
30 and analysing the phase difference of a signal received by wireless receiver and the fixed receiver, respectively.

The remote-controlled entry system may comprise at least one authorisation unit, wherein the authorisation unit is capable of authorising the at least one wireless
35 electronic device by comparing a code (WPIN) stored in a memory of the wireless

electronic device with a code (FPIN) stored in a memory of the stationary detection system.

The authorisation unit may be integrated with the analysing unit, the wireless
5 electronic device, the fixed receiver or the fixed transceiver. It may be an
advantage that any of the analysing unit, the wireless electronics device, the fixed
receiver or the fixed transceiver is capable of authorising the wireless electronic
device. The FPIN code may be stored in a memory of the fixed receiver, the fixed
transceiver or the analysing unit or elsewhere in the stationary detection system.

10

The WPIN code stored in the wireless electronic device may be transmitted to the
fixed receiver where the WPIN code is compared with the FPIN code or the fixed
receiver may transfer the WPIN code to the analysing unit where the WPIN code is
compared with the FPIN code. In case the FPIN code matches the WPIN code the
15 fixed transmitter may transmit an authorising signal to the wireless electronic
device which authorises the wireless electronic device.

Alternatively, the FPIN code stored in a memory of the stationary detection
system may be transmitted to the wireless electronic device where the FPIN code
20 is compared with the WPIN code, and if the FPIN code matches the WPIN code the
wireless electronic device is authorised.

The fixed receiver or the fixed transceiver may be electrically wired to the
analysing unit. Alternatively, the fixed receiver or the fixed transceiver may be
25 wirelessly connected to the analysing unit.

The analysing unit may be capable of determining whether the at least one
wireless electronic device is approaching, moving away or passing by the
stationary detection system. It may be an advantage that the analysing unit is
30 capable of determining if the user carrying the wireless electronic device is only
passing by the stationary detection system, because in that case the locking
states should not be switched. The event of a user passing by may be determined
by the use of a timer delay.

The wireless electronic device may be capable of notifying the user by sound or vibration when the locking state of the at least one lock is switched. It may be an advantage that the user is notified in case of a switch of a locking state, for instance by a vibration made by the wireless electronic device because then the stationary detection system or some other system of a vehicle may not need to notify the user by sound or flashing lights. Accordingly, the user may be discreetly notified of a change of a locking state.

The wireless electronic device may be capable of transmitting a signal to at least one fixed receiver on request when a user interacts with a user interface of the wireless electronic device, where said signal transmitted on request enables switching the locking states of the at least one lock.

The interaction with the user interface may be performed by the user pushing a bottom of eg. a mobile phone, by entering a code on a keyboard or by speaking to the voice recognition system of a mobile phone. It may be an advantage that the user is capable of switching the locking states on request because the user may have disabled the capability of the remote-controlled entry system to automatically switch locking states in dependence of a distance between the wireless electronic device and the stationary detection system.

The remote-controlled entry system may be capable of being turned into a disabled state on request from the user, wherein the locking states of the locks do no switch in dependence of a distance between the wireless electronic device and the stationary detection system when the remote-controlled entry system has been turned into the disabled state. It may be an advantage that the user is capable of disabling the capability of the remote-controlled entry system to automatically switch locking states in dependence of a distance between the wireless electronic device and the stationary detection system because the user may want to avoid switching of locking states when the user moves around in the vicinity of a stationary detection system.

The wireless electronic device may be capable of being authorised for time limited duration when provided with a code. It may be an advantage to be able to

authorising a person for a time limited duration if a person should be allowed temporary access to for instance a room such as a hotel room.

- In a second aspect, the invention relates to a remote-controlled entry system
- 5 comprising
- at least one stationary detection system, each comprising
 - a fixed receiver or a fixed transceiver, where the fixed receiver or the fixed transceiver is capable of receiving a signal being transmitted from a wireless transmitter or a wireless transceiver comprised by one of at least one associated
 - 10 wireless electronic device, and where the fixed transceiver is capable of transmitting a signal to the wireless transceiver, and
 - an analysing unit being capable of determining a signal parameter from the signal received by the fixed receiver or the fixed transceiver, said signal parameter being indicative of a distance between any one of the at least one
 - 15 associated wireless electronic device and any one of the at least one stationary detection system, and said analysing unit being in connection with the fixed receiver or the fixed transceiver and at least one associated lock capable of being switched between locking states comprising a locked state and an un-locked state, where the at least one lock is capable of locking a door of at least one stationary
 - 20 entity, wherein
 - the switching between locking states of the at least one lock is enabled by changes of the distance between any one of the at least one stationary detection system and a user carrying any one of the at least one associated wireless
 - 25 electronic device, and
 - the associated wireless electronic device has at least first and second functions, said first function is related to a primary use of the associated wireless electronic device, and said second function is transmission of a signal for remote-controlled
 - 30 switching the locking states of the at least one associated lock.

In a third aspect, the invention relates to a computer program product being adapted to enable a computer system comprising at least one computer having data storage means associated therewith to operate a remote-controlled entry

35 system according to the first aspect of the invention.

This aspect of the invention is particularly, but not exclusively, advantageous in that the present invention may be implemented by a computer program product enabling a computer system to perform the operations of the first aspect of the
5 invention. Thus, it is contemplated that some known wireless electronic device, fixed receiver, fixed transceiver and/or analysing unit may be changed to operate according to the present invention by installing a computer program product on a computer system controlling the wireless electronic device, the fixed receiver, the fixed transceiver and/or the analysing unit. Such a computer program product
10 may be provided on any kind of computer readable medium, e.g. magnetically or optically based medium, or through a computer based network, e.g. the Internet.

The first, second and third aspect of the present invention may each be combined with any of the other aspects. These and other aspects of the invention will be
15 apparent from and elucidated with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF THE FIGURES

20 The present invention will now be explained, by way of example only, with reference to the accompanying figures, where

Fig. 1 is an illustration of a remote-controlled entry system comprising a wireless electronic device comprising a wireless transmitter capable of communicating with
25 a fixed receiver comprised by a stationary detection system according to the present invention.

Fig. 2 is an illustration of a remote-controlled entry system comprising a wireless electronic device comprising a wireless transceiver capable of communicating with
30 a fixed transceiver comprised by a stationary detection system according to the present invention.

Fig. 3 shows graphs which illustrates the relation between the distance D and the amplitude A of the signal received by the fixed receiver, where the distance D is

the distance between the wireless electronic device and the stationary detection unit according to the present invention.

Fig. 4 is an illustration of a method for determining the distance between the wireless electronic device and the stationary detection system by using a relative phase shift between the transmitted signal and the received signal.

DESCRIPTION OF AN EMBODIMENT

Fig. 1 is an illustration of a remote-controlled entry system 101 comprising one or more stationary entities 110 such as buildings, hotel rooms, houses, rooms or vehicles. The stationary entities 110 has one or more lockable doors 112 provided with locks 111, such as electrical locks that locks or unlocks the associated doors 112 when they are provided with appropriate locking signals LS. The locking signal LS may be an electric binary signal having a logical low level and a logical high level. The locking signal LS may also be an electric voltage, or any other suitable electric signal, capable of operating a solenoid of a lock 111 to lock and unlock the lock 111.

The one or more lockable doors 112 may be doors of a vehicle, such as entry doors and tail gates. Also the doors 112 may be front doors or inside doors of a building or the doors may be gates to a property.

Thus, any one of the locks 111 are capable of being switched to positions which locks or unlocks the associated door 112. In the following the locking positions of any one of the locks 111 are referred to as locking states and the change from a locked position to an unlocked position, or vice versa, is referred to as switching locking states. Thus, any one of the locks 111 may be in a locked state or an unlocked state independently of each other.

30

The remote-controlled entry system 101 further comprises a stationary detection system 120 comprising at least one fixed receiver 121 and an analysing unit 122. The fixed receiver 121 is connected with the analysing unit 122 via a connection 123, such as an electric wire connection or a wireless connection. In case the stationary detection system 120 comprises a plurality of fixed receivers 121, each

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fixed receiver has an electric wire connection or a wireless radio connection to the analysing unit 122. The fixed receiver 121 and the analysing unit 122 may be separate units or they may be combined into one unit. The analysing unit 122 is connected with the locks 111 via connections 124, such as an electric wire
5 connections or wireless radio connections. The analysing unit is capable of switching the locking states of any of the locks 111 between locked states and unlocked states by changing for instance the electrical voltage of the locking signals LS from a logical low level to a logical high level or by changing the voltage supplied to a solenoid of any of the locks 111.

10

The remote-controlled entry system also comprises one or more associated wireless electronic devices 130, such as mobile phones, personal digital assistants (PDA), watches, computers, head-sets or a bracelet transmitter such as a Bluetooth bracelet transmitter. The wireless electronic device 130 includes a
15 wireless transmitter 131 and a wireless antenna 132. The wireless transmitter 131 is capable of transmitting signals via the wireless antenna 132.

The fixed receiver 121 is capable of receiving the signals being transmitted from the wireless transmitter 132 via fixed antenna 125.

20

It should be understood that any of the wireless antenna 132 and the fixed antenna 125 need not be visible antennas, but may be integrated into the wireless transmitter or the fixed receiver, for instance the housing of the wireless transmitter 131 or the housing of the wireless electronic device 130.

25

The wireless transmitter 131 may be a short range transmitter that transmits signals that are receivable by the fixed receiver 121 when the distance between the wireless transmitter 131 and the fixed receiver 121 is less than for instance 200 meters, or when the distance is less than 100 meters, 10 meters or less than
30 1 meter.

Clearly the maximum distance where the signal transmitted from the wireless transmitter 131 is receivable by the fixed receiver 121 should be adapted to the use of the remote-controlled entry system. That is, a maximum distance of 1000
35 meters is not very useful since the user is not interested in unlocking a door 112

when distance between the user carrying the wireless electronic device 130 and the door 112 is 1000 meters.

Similarly, the minimum distance where the signal transmitted from the wireless transmitter 131 is receivable by the fixed receiver 121 should be adapted to the use of the remote-controlled entry system. That is, a minimum distance of 0.3 meters is not very useful since a remote-controlled entry system is not very useful if the user is required to be closer than 0.3 meters to the fixed receiver 121 in order to unlock a door 112.

10

However, of course the wireless transmitter may be a long range transmitter capable of transmitting signals that are receivable by the fixed receiver for distances larger than 1000 meters as long as the remote-controlled entry system is adapted so that unlocking a door requires that the distance between the user and the door 112 or the fixed receiver 121 is less than for instance 200 meters.

For instance a Bluetooth receiver-transceiver system has communication ranges of 1 meter, 10 meters or 100 meters depending on the particular power class of the Bluetooth system.

20

The signal transmitted by the wireless transmitter 132, or any other signal referred to, should not necessarily be understood as a single signal but may be composed of plurality of signals being temporally and/or spectrally separated. For instance the transmitted signal may employ the Bluetooth protocol which uses a frequency-hopping spread spectrum, or the transmitted signal may employ multiplexed transmission of signals having difference carrier frequencies and/or modulation frequencies.

The remote-controlled entry system 101 is capable of switching the locking states of any one of the locks 111 from an unlocked state to a locked state or vice versa by transmitting a signal from the wireless transmitter 131 to the fixed receiver 121. The signal may be transmitted continuously or the signal may be transmitted in intervals, such as an alternating sequence of first periods where a signal is transmitted and second periods where no signal is transmitted. The analyser 122 analyses the signal received by the receiver 121. Initially, the analyser may

determine if the wireless electronic device 130 is authorised to communicate with the stationary detection system 120 and if it is authorised the analyser enables the capability of the transmitter 131 to switch locking states of the locks 111 when a signal is transmitted from the wireless transmitter 131 to the fixed
5 receiver 121.

The capability of the transmitter 131 to switch locking states of the locks 111 may be based on the distance between the wireless electronic device 130 and the fixed receiver 121. For instance when the distance is smaller than a distance A then one
10 or more of the locks 111 are unlocked, or enabled to be unlocked; and when the distance is greater than a distance B then one or more of the locks 111 are locked, or enabled to be locked. Distance A may be equal to distance B or distance A may be smaller than B in order to provide for hysteresis behaviour between the criteria for switching locking states and the locking states.

15

The analysing unit 122 is capable of determining a signal parameter from the signal received by the fixed receiver 121 where the signal parameter is indicative of a distance between a wireless electronic device 130 and a fixed receiver 121. Accordingly, the signal parameter may be equal to the distance or the signal
20 parameter may correspond to a distance, for instance the signal parameter may be proportional to the distance. By comparing the parameter with the preconfigured threshold distances A and B, the analysing unit 122 is capable of determining if switching the locking state of the at least one lock should be enabled and/or performed immediately.

25

The term "determining if switching the locking state of at least one lock should be enabled" may be understood so that the remote-controlled entry system is prepared to switch locking states given an additional condition will be satisfied. The additional condition may be a timer delay, meaning that, when the switching
30 of locking states has been enabled the actual switching of locking states will be performed after a delay between for instance 1 second to 100 seconds. The delay may be selectable and adjustable by the user, for instance by entering a delay on the user interface of the wireless electronic device 130. The additional condition, may also be an authorisation performed for instance by the analysing unit 122.
35 Alternatively, or additionally, the additional condition may be an interaction of the

user with the wireless electronic device 130, for instance requiring the user to push a bottom of the user interface of the wireless electronic device 130 or speaking an acknowledge word to the voice recognition system of the wireless electronic device 130.

- 5 The authorisation of the wireless electronic device 130 basically consists in comparing a code WPIN being stored in a memory of the wireless electronic device 130 with a code FPIN being stored in a memory of the analysing unit 122. If the code WPIN is equal to or otherwise matches the code FPIN, then the wireless electronic device 130 is authorised to communicate with the analysing
10 unit 122 and to switch locking states of the locks 111.

The authorisation of the wireless electronic device 130 may be initiated by a transmission of the WPIN code from the transmitter 131 to the receiver 121. The receiver 121 provides the analysing unit 122 with the WPIN code which
15 determines if the wireless electronic device 130 can be authorised. The communication between the wireless electronic device 130 and the analysing unit 122 may be encrypted so that other receivers are not able to listen in or detect the transmitted communicated data, such as the WPIN code.

- 20 The WPIN code, eg. a Personal Identification Number, may entered on a user interface, such as a keyboard of the wireless electronic device 130, or otherwise communicated to the wireless electronic device 132. Alternatively, the WPIN code may be provided by a SIM card (subscriber identification module) inserted into the wireless electronic device 130 or the WPIN code may be build into the device by
25 the manufacturer. Alternatively, the user may choose a WPIN code for instance by entering the code on the keyboard of the wireless electronic device 130.

Similarly, the FPIN code may be entered on a user interface or otherwise communicated to the analysing unit 122. The FPIN code may also be provided by
30 a SIM card or the FPIN code may be build into the analysing unit 122 by the manufacturer. For instance, a WPIN code contained in a SIM card that has been inserted into the wireless electronic device 130, may be communicated to a memory of the analysing unit 122 and stored as a FPIN code in a memory of the analysing unit 122.

Prior to transmitting the WPIN code from the wireless transmitter 131 to the fixed receiver 121, the transmitter 131 may send an interrogation signal or wake-up signal for interrogating the fixed receiver 121 and/or the analysing unit 122. Upon receipt of an interrogation signal the fixed receiver 121 may respond by
5 transmitting a responding identification signal which may include information such as transmitter-type and transmitter-name. Upon receipt of the interrogation signal the fixed transmitter 121 may also send a wake-up signal to the analysing unit 122 causing the analysing unit to get ready to receive and analyse the WPIN code for authorisations purpose and to get ready for analysing received signals in order
10 to determine if a locking state of one or more locks 111 should be switched.

Fig. 2 is an illustration of a remote-controlled entry system 201. Those features of Fig. 2 which have a corresponding function as similar features of Fig. 1 are assigned the same reference numbers and are not described in relation to Fig. 2.
15

The stationary detection system 220 comprises both a fixed receiver 121 and a fixed transmitter 222. The fixed receiver 121 and the fixed transmitter may be separate units or they may be integrated into one unit. Whether the fixed receiver 121 and the fixed transmitter are separate units or they are integrated into one
20 unit, the combination of the fixed receiver 121 and the fixed transmitter is also referred to a fixed transceiver 223.

Similarly, the remote-controlled entry system 201 also comprises one or more associated wireless electronic devices 130 each comprising a wireless transmitter
25 131 and a wireless receiver 232. The combination of the wireless transmitter 131 and the wireless receiver 232 is also referred to as a wireless transceiver 233.

Since both the wireless electronic device 130 and the stationary detection system 220 comprises transceivers, the wireless electronic device 130 is capable of both
30 transmitting and receiving signals to/from the stationary detection system 220. Similarly, the stationary detection system 220 is also capable of both transmitting and receiving signals to/from the wireless electronic device 130.

The fixed transmitter 222 of the stationary detection system 220 may send signals to the wireless electronic device 130 for various purposes.

For instance, the fixed transmitter 222 may send an interrogation signal or wake
5 up signal to the wireless receiver 232 which causes the wireless electronic device 130 to identify itself by transmitting for instance information about transmitter name and transmitter type to the fixed receiver 121. The interrogation signal may be send continuously or in alternating periods, for instance a short period where an interrogation signal is transmitted followed by a longer period where no signals
10 are transmitted.

The fixed transmitter 222 may also send an authorisation signal containing the FPIN code stored in the analysing unit 122. Upon receipt of the FPIN code, the wireless electronic device 130 compares the received FPIN code with the stored
15 WPIN code, and if the received FPIN code matches the stored WPIN code, the wireless electronic device 130 is authorised to communicate with the stationary detection system 220.

In case the wireless electronic device 130 has become authorised to communicate
20 with the stationary detection system 220, the wireless electronic device 130 may act as an analysing device in order to analyse the received signal from the stationary detection system 220 so as to determine if the switching state of one or more of the locks 111 should be switched. If the switching state should be switched then the wireless electronic device 130 may transmit a signal to the
25 stationary detection device 120, which causes the state of one or more of the locking signals LS to switch. Therefore the analysing capability of the stationary detection device 120 may be handled by the wireless electronic device 130 and the analysing unit 122 may be omitted or the function of the analysing unit may be reduced to transmit locking signals LS.

30

The communication between the wireless transceiver 233 and the fixed transceiver 223 may be half duplex or full duplex. The protocol for communication between the wireless transceiver 233 and the fixed transceiver 223 is determined by the type of the transceivers. For instance the transceivers may be Bluetooth
35 transceivers in which case the communication between transceivers is determined

by the Bluetooth protocol and, therefore, will not be described here. Any one of the at least one wireless transceivers 233 and any one of the at least one fixed transceivers 223 may act as a master transceiver and the other one or more transceivers then acts as slaves. For instance the fixed transceiver 223 may act as
5 master and the wireless transceiver 233 may act as slave.

The capability of any one of the locks 111 to be remote-controlled may be enabled or disabled by the user so that, when the criteria for switching locking states is satisfied, only locking states of those locks that are enabled will be switched.

10

The remote-controlled entry system 101,201 may comprise one or more stationary entities 110 where each stationary entity comprises one or more stationary detection units 120,220 where each stationary detection unit is connected to one or more locks 111. As such, a single wireless electronic device
15 130 can be used for switching the locking states of locks 111 of different entities 110, such as locks of the user's one or more vehicles, private home and workplace.

Also, the remote-controlled entry system 101,201 may comprise one or more
20 wireless electronic devices 130. Accordingly, more than one user, for instance the members of a family or the employees at a workplace, can each have a wireless electronic device 130 capable of switching locking states.

Fig. 3 shows graphs which illustrates the relation between the distance D and the
25 amplitude A of the signal received by the fixed receiver 121, where the distance D is the distance between the wireless electronic device 130 and the stationary detection unit 120,220.

Graph 310 illustrates a situation where a user carrying the wireless electronic
30 device 130 approaches the stationary detection unit 120,220. The starting point is indicated with a dot 313 and the approaching direction is indicated by arrows 312. Thus, as the user approaches the stationary detection unit 120,220 the distance D decreases and the amplitude A of the received signal increases as shown by curve 311. When the distance D becomes smaller than the distance threshold D_a , the
35 amplitude A becomes greater than the amplitude threshold A_a . The analysing unit

122 detects that the amplitude A is greater than amplitude threshold A_a , and in response to that, the analysing unit 122 either enables the possibility to switch locking states for unlocking one or more locks 111, or the analysing unit 122 immediately unlocks one or more locks 111 by switching the logical level of one or
5 more signals LS or by changing the voltage of a signal being connected to a solenoid of a lock 111 so as to unlock the lock. The enabling of the possibility to unlock one or more locks 111 may be succeed by a timer delay, or other procedures such as an authorisation, before actually unlocking one or more locks 111.

10

Graph 320 illustrates a situation where a user carrying the wireless electronic device 130 moves away from the stationary detection unit 120,220 as indicated by arrows 322. The starting point is indicated with a dot 323 and the direction is indicated by arrows 322. Thus, as the user moves away from the stationary
15 detection unit 120,220 the distance D increases and the amplitude A of the received signal decreases as shown by curve 321. When the distance D becomes smaller than the distance threshold D_b , the amplitude A decreases below the amplitude threshold A_b . The analysing unit 122 detects that the amplitude A is smaller than the amplitude threshold A_b , and in response to that, the analysing
20 unit 122 either enables the possibility to switch locking states for locking one or more locks 111 or the analysing unit 122 immediately locks one or more locks 111 by switching the logical level of one or more signals LS . The enabling of the possibility to lock one or more locks may be succeed by a timer delay, or other procedures such as an authorisation, before actually locking one or more locks
25 111.

Graph 330 illustrates the hysteresis effects obtained when the amplitude threshold A_a is greater than the amplitude threshold A_b . The hysteresis curve 331 has two states, that is, an unlocked locking state LSU and a locked locking state LSL .
30 Thus, as the user carrying the wireless electronic device 130 approaches the stationary detection device 120,220, the hysteresis curve 331 will follow the arrows 332, so that the locking state switches from the locked locking state LSL to the unlocked locking state LSU when the distance D equals or becomes less than the distance threshold D_a . When the locking state is initially in the unlocked
35 locking state LSU and the user moves away from the stationary detection unit the

hysteresis curve 331 will follow the arrows 333, so that the locking state switches from the unlocked locking state LSU to the locked locking state LSL when the distance D equals or becomes greater than threshold D_b .

- 5 Even though the distance D has become smaller than the threshold D_a , which enables the locking state to be switched from LSL to LSU, an additional timer delay may be inserted before actually executing the switch of the locking state from LSL to LSU. The timer delay may be selectable and adjustable by the user. The timer delay allows the user to pass by the stationary detection unit 120,220,
- 10 without causing the locking state to switch - even if the distance D first decreases from a value greater than D_b to a value smaller than D_a and secondly increases from the value smaller than D_a to a value greater than D_b - if the timer delay is long enough to allow the user to pass by the stationary detection unit 120,220.
- 15 Fig. 4 is an illustration of a method for determining the distance between the wireless electronic device 130 and the stationary detection system 120 by using a relative phase shift between the transmitted signal and the received signal. In Fig. 4 the abscissa represents time t and the ordinate represents the amplitude in arbitrary units AU of the transmitted signal and the received signal. In Fig. 4 the
- 20 transmitted signal from the wireless transmitter 131 is illustrated by item 411, and the received signal received by the fixed receiver 121 is illustrated by the item 412. The phase difference 413 or time difference 413 is a measure of the distance between the wireless transmitter 131 and fixed receiver 121. Accordingly by measuring the time phase difference 413, a parameter being indicative or
- 25 equal to the distance between the wireless transmitter 131 and the fixed receiver 121 can be determined. By comparing the distance or the parameter being equivalent to the distance, with distance thresholds D_a and D_b as defined in Fig. 3, it is possible to determine if a locking state of a lock 111 should be changed. That is, when the distance determined from the phase difference 413 equals or
- 30 becomes less than the distance threshold D_a the locking state switches or is enabled to switch from the locked locking state LSL to the unlocked locking state LSU. When the distance determined from the phase difference 413 equals or becomes greater than the threshold D_b the locking state switches or is enabled to switch from the unlocked locking state LSU to the locked locking state LSL.

In order to determine the phase difference 413 it is required to find the difference in time between eg. the time of zero-crossing 414 of the transmitted signal 411 and the time of the eg. the zero-crossing 415 of the received signal 412. This may be achieved by synchronising the wireless transmitter 131 with the fixed receiver 5 121. In practice this can be achieved by synchronising a clock located in the wireless transmitter 131 (or the wireless electronic device 130) with a clock located in the fixed receiver 121 (or the stationary detection system 220). Since the transmitted signal 411 is transmitted at predefined moments, known by the stationary detection system 220, it is possible to determine the time difference 10 413 by calculating the time difference between the moment 414 of transmission and the moment 415 of receiving the received signal 412.

Instead of using synchronised clock, a synchronised signal, for instance a clock signal, can be used to obtain a temporal synchronisation between the wireless 15 transmitter 131 and the fixed receiver 121. Also, a phase locked loop can be used for synchronising the wireless transmitter 131 with the fixed receiver 121.

When the user approaches or moves away from an entity 110 containing one or more locks 111 the wireless electronic device 130 is capable of notifying the user 20 if the locking state of a lock 111 is switched. For instance when the user gets close enough to an entity 110 so that the locking state of a lock 111 is switched, the fixed transceiver 223 can transmit a signal to the wireless transceiver 233 which makes the wireless electronic device 130 make a sound or vibration that notifies the user that the locking state of a lock 111 has switched from a locked 25 state to an unlocked state. Similarly, when the user gets far enough away from the entity 110 so that the locking state of a lock 111 is switched, the fixed transceiver 223 can transmit a signal to the wireless transceiver 233 which makes the wireless electronic device 130 make a sound or vibration that notifies the user that the locking state of a lock 111 has switched from an unlocked state to a 30 locked state. The sound or vibration provided from the wireless electronic device 130 when a locking state switches to a locked state is distinguishable from the sound or vibration provided when a locking state switches to an unlocked state.

If a user carrying a wireless electronic device 130 moves around in the vicinity of 35 an entity 110 the locks 111 of the entity 110 may undesirably switch between

locking states. Therefore, the user is able to disable the capability of the remote-controlled entry system 101,201 to automatically switch locking states of one or more locks 111 in dependence of a distance between a wireless electronic device 130 and a stationary detection device 120,220 by selecting a disabled state of the
5 remote-controlled entry system 101,201. The disabled state may be selected from a user interface or a keyboard of the wireless electronic device 130 or the stationary detection device 120. Accordingly, when the remote-controlled entry system is in a disabled state, the locking states of the locks 111 do no switch in dependence of a distance between the wireless transmitter 131 and the fixed
10 receiver 121.

When the remote-controlled entry system 201 is in a disabled state, the user is able to switch locking states of one or more locks 111 manually by pressing a key or a combination of keys of a keyboard or a user interface of the wireless
15 electronic device 130.

Even when the remote-controlled entry system 201 is enabled to be capable of switching locking states automatically in dependence of a distance between a wireless electronic device 130 and a stationary detection device 120,220, the user is also able to switch locking states manually by pressing a key or a combination
20 of keys of a keyboard or a user interface of the wireless electronic device 130. Thus, the user may switch the locking state of a lock 111 manually, independently of the locking state determined by the analysing unit 122 in relation to a distance value.

25 A person may carry a wireless electronic device 130, where that wireless electronic device does not have a code WPIN allowing the wireless electronic device to be authorised to communicate with the stationary detection unit 120 for switching locking states of the locks 111. If that person should be allowed to get access to an entity 110, that person may be provided with a code that can be
30 entered manually on a user interface of the wireless electronic device 130 which will enable the wireless electronic device to be authorised to switch locking states of a particular lock 111, or a plurality of locks 111 associated with a particular entity 110. The code being provided to the person may have time limited duration, so that when the time limited duration has expired, the wireless

electronic device that was provided with the code will no longer be able to be authorised to switch locking states.

5 Instead of requiring the person to enter the code manually in order to enable the wireless electronic device 130 to be authorised, the wireless electronic device 130 may be provided with a code being wirelessly communicated to the wireless electronic device 130 from another wireless electronic device or a stationary.

10 The remote-controlled entry system is capable of performing other tasks than switching locking states of locks 111. For instance the remote-controlled entry system may be used for remote controlled switching on and off of a furnace in a vehicle. The remote-controlled entry system may be used to apply personal settings of a seat- and wheel positions in a vehicle, so that when a first wireless electronic device 130 approaches the vehicle then the seat- and wheel are being
15 positioned corresponding to positions being assigned to the first wireless electronic device. Similarly, when a second wireless electronic device 130 approaches the vehicle then the seat- and wheel are being positioned corresponding to positions being assigned to the second wireless electronic device. For instance, the seat- and wheel may be positioned when the locking
20 states are switched or enabled to be switched to an un-locked state.

It should be noted that even though reference are made to "switch lock states" in the above description, this may equivalently be understood as "enabled to switch locking states" which meaning is clear from the description.

25

Although the present invention has been described in connection with the specified embodiments, it is not intended to be limited to the specific form set forth herein. Rather, the scope of the present invention is limited only by the accompanying claims. In the claims, the term "comprising" does not exclude the
30 presence of other elements or steps. Additionally, although individual features may be included in different claims, these may possibly be advantageously combined, and the inclusion in different claims does not imply that a combination of features is not feasible and/or advantageous. In addition, singular references do not exclude a plurality. Thus, references to "a", "an", "first", "second" etc. do

not preclude a plurality. Furthermore, reference signs in the claims shall not be construed as limiting the scope.

CLAIMS

1. A method for operating a remote-controlled entry system (101,201), said remote-controlled entry system comprising
- 5
- at least one lock (111) capable of being switched between locking states comprising a locked state and an un-locked state, where each of the at least one lock is capable of locking a door (112) of at least one stationary entity (110),
 - at least one wireless electronic device (130) each comprising a wireless

10 transmitter (131) or a wireless transceiver (233), and

 - at least one stationary detection system (120,220), each comprising
 - a fixed receiver (121) or a fixed transceiver (223), where the fixed receiver (121) or the fixed transceiver (223) is capable of receiving a signal being transmitted from the wireless transmitter (131) or the wireless transceiver (233),

15 and where the fixed transceiver (233) is capable of transmitting a signal to the wireless transceiver (233), and

 - an analysing unit (122) being capable of determining a signal parameter from the signal received by the fixed receiver (121) or the fixed transceiver (222), said signal parameter being indicative of a distance between one of the at least

20 one wireless electronic device (130) and one of the at least one stationary detection system (220), and said analysing unit being in connection with the fixed receiver (121) or the fixed transceiver (223) and the at least one lock (111),

wherein
- 25 - the switching between locking states of the at least one lock (111) is enabled by changes of the distance between one of the at least one stationary detection system (120,220) and a user carrying one of the at least one wireless electronic device (130), and
- 30 - the wireless electronic device (130) has at least first and second functions, said first function is related to a primary use of the wireless electronic device, and said second function is transmission of a signal for remote-controlled switching the locking states of the at least one lock (111).

2. A method according to claim 1, wherein wireless electronic device (130) is capable of notifying the user by sound or vibration when the locking state of the at least one lock (111) is switched.
- 5 3. A method according to any of the preceding claims, wherein the analysing unit (122) is capable of determining whether the at least one wireless electronic device (130) is approaching, moving away or passing by the stationary detection system (120,220).
- 10 4. A method according to any of the preceding claims, wherein the remote-controlled entry system (101,202) is capable of being turned into a disabled state on request from the user, wherein the locking states of the locks (111) do not switch in dependence of a distance between the wireless electronic device (130) and the stationary detection system (220) when the remote-controlled entry
15 system has been turned into the disabled state.
5. A method according to any of the preceding claims, wherein the wireless electronic device (130) is capable of being authorised for time limited duration when provided with a code.
- 20 6. A method according to claim 1, wherein the method further comprises
- transmitting a signal from the wireless transmitter (131) or the wireless transceiver (232) of one of the at least one wireless electronic devices (130),
 - receiving the signal transmitted from the wireless transmitter (131) or the
25 wireless transceiver (232) by the fixed receiver (121) or the fixed transceiver (222),
 - determining the signal parameter from the signal, received by the fixed receiver (121) or the fixed transceiver (222), by processing the signal in the analysing unit (122), and
 - 30 - analysing the signal parameter for determining if switching the locking state of the at least one lock (111) should be enabled.
7. A method according to any of the preceding claims, wherein the method further comprises

- transmitting a signal from the fixed transceiver (223) of one of the at least one stationary detection system (220),
- receiving the signal transmitted from the fixed transceiver (223) by the wireless transceiver (233) of one of the at least one wireless electronic devices (130),
- 5 - determining the signal parameter from the signal, received by the wireless transceiver (233), by processing the signal in the wireless electronic device (130),
- analysing the signal parameter for determining if switching the locking state of the at least one lock (111) should be enabled, and
- transmitting an enabling signal from the wireless transmitter (131) or wireless
10 transceiver (233) of one of the at least one wireless electronic device (130) to the fixed receiver (121) or the fixed transceiver (223), where the enabling signal indicates that switching the locking state of the at least one lock (111) should be enabled.

15 8. A method according to any of the preceding claims, wherein the method further comprises

- interrogating the stationary detection system (220) by transmitting an interrogation signal from the wireless transmitter (131) of one of the at least one wireless electronic devices (130), and
- 20 - authorising the wireless electronic device (130) by comparing a code (WPIN) stored in a memory of the wireless electronic device (130) with a code (FPIN) stored in a memory of the analysing unit (122).

9. A method according to any of the preceding claims, wherein the fixed receiver
25 (121) or the fixed transceiver (223) has at least first and second functions, said first function is related to a primary use of the fixed receiver (121) or the fixed transceiver (223), and said second function is receiving the signal from the wireless electronic device (130) for remote-controlled switching the locking states of the at least one lock (111).

30

10. A method according to any of the preceding claims, wherein the at least one analysing unit has at least first and second functions, said first function is related to a primary use of the analysing unit, and said second function is analysing data being transmitted from the wireless electronic device (130) for remote-controlled
35 switching the locking states of the at least one lock (111).

11. A method according to any of the preceding claims, wherein
- the fixed receiver (121) or the fixed transceiver (223) is preinstalled in at least one of the stationary entities (110) for the purpose of the first function related to

5 a primary use of the fixed receiver or the fixed transceiver, and/or wherein

 - the analysing unit (122) is preinstalled in at least one of the stationary entities (110) for the purpose of the first function related to a primary use of the analysing unit.

10 12. A method according to any of the preceding claims, wherein the at least one wireless electronic device (130) is comprised in the group of a mobile phone, a personal digital assistant (PDA), a watch, a computer, a head-set and a bracelet transmitter.

15 13. A method according to any of the preceding claims, wherein

 - the at least one stationary entity is comprised in the group of vehicles, boats, buildings and rooms,
 - at least one fixed receiver (121) or at least one fixed transceiver (223) is fixed to each of the at least one stationary entity (110),

20 - at least one analysing unit (122) is fixed to each of the at least one stationary entity (110), and

 - the at least one wireless electronic device (130) is capable of remote-controlled switching the locking states of the at least one lock (111) fixed to each of the at least one stationary entity (110) by transmitting a signal to the at least one fixed

25 receiver (121) or the at least one fixed transceiver (223).

14. A method according to any of the preceding claims, wherein the signal parameter is determined from one or more signal amplitudes.

30 15. A method according to any of the preceding claims, wherein the signal parameter is determined from a phase difference of the signal transmitted from the wireless transmitter (131) and the signal received by the fixed receiver (121).

16. A method according to any of the preceding claims, wherein the signal

35 parameter is determined from a phase difference of the signal transmitted from

the fixed transceiver (223) and the signal received by the wireless transceiver (233).

17. A method according to any of the preceding claims, wherein the remote-
5 controlled entry system (101,201) comprises at least one authorisation unit,
wherein the authorisation unit is capable of authorising the at least one wireless
electronic device (130) by comparing a code (WPIN) stored in the wireless
electronic device with a code (FPIN) stored in a memory of the stationary
detection system (120,220).

10

18. A method according to any of the preceding claims, wherein the fixed receiver
(121) or the fixed transceiver (223) is electrically wired to the analysing unit
(122).

15 19. A method according to any of the preceding claims, wherein the fixed receiver
(121) or the fixed transceiver (223) is wirelessly connected to the analysing unit
(122).

20. A method according to any of the preceding claims, wherein the wireless
20 electronic device (130) is capable of transmitting a signal to at least one fixed
receiver (121) on request when a user interacts with a user interface of the
wireless electronic device (130), where said signal transmitted on request enables
switching the locking states of the at least one lock (111).

25 21. A remote-controlled entry system comprising

- at least one stationary detection system (220), each comprising

- a fixed receiver (121) or a fixed transceiver (223), where the fixed
receiver (121) or the fixed transceiver (223) is capable of receiving a signal being
transmitted from a wireless transmitter (131) or a wireless transceiver (233)

30 comprised by one of at least one associated wireless electronic device (130), and
where the fixed transceiver (233) is capable of transmitting a signal to the
wireless transceiver (233), and

- an analysing unit (122) being capable of determining a signal parameter
from the signal received by the fixed receiver (121) or the fixed transceiver (222),

35 said signal parameter being indicative of a distance between any one of the at

least one associated wireless electronic device (130) and any one of the at least one stationary detection system (220), and said analysing unit being in connection with the fixed receiver (121) or the fixed transceiver (223) and at least one associated lock (111) capable of being switched between locking states
5 comprising a locked state and an un-locked state, where the at least one associated lock is capable of locking a door (112) of at least one stationary entity (110), wherein

- the switching between locking states of the at least one lock (111) is enabled by
10 changes of the distance between any one of the at least one stationary detection system (220) and a user carrying any one of the at least one associated wireless electronic device (130), and

- the associated wireless electronic device (130) has at least first and second
15 functions, said first function is related to a primary use of the associated wireless electronic device, and said second function is transmission of a signal for remote-controlled switching the locking states of the at least one associated lock (111).

22. A computer program product being adapted to enable a computer system
20 comprising at least one computer having data storage means associated therewith to operate a remote-controlled entry system (101,201) according to the method as claimed in claim 1.

1/4

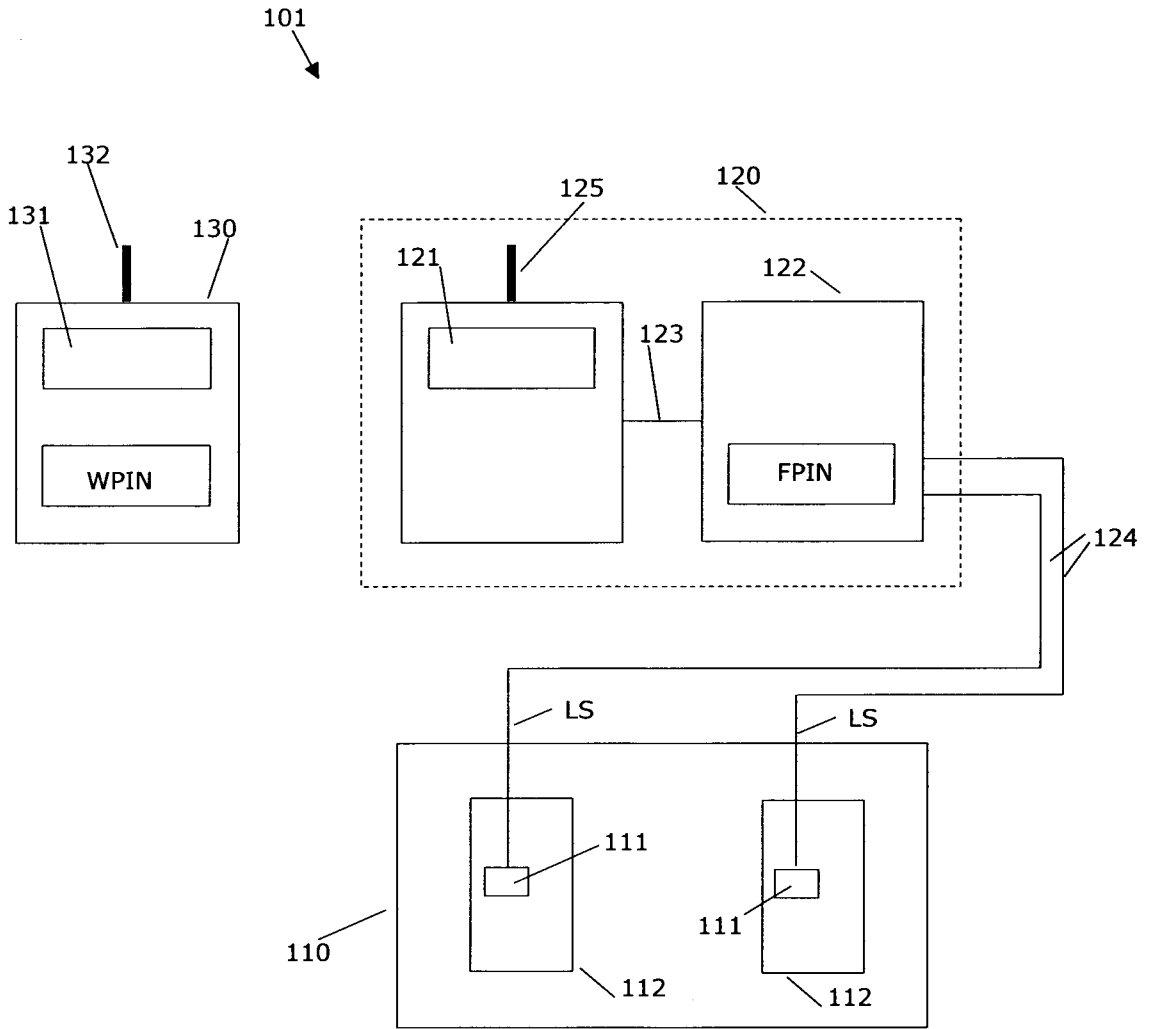


Fig. 1

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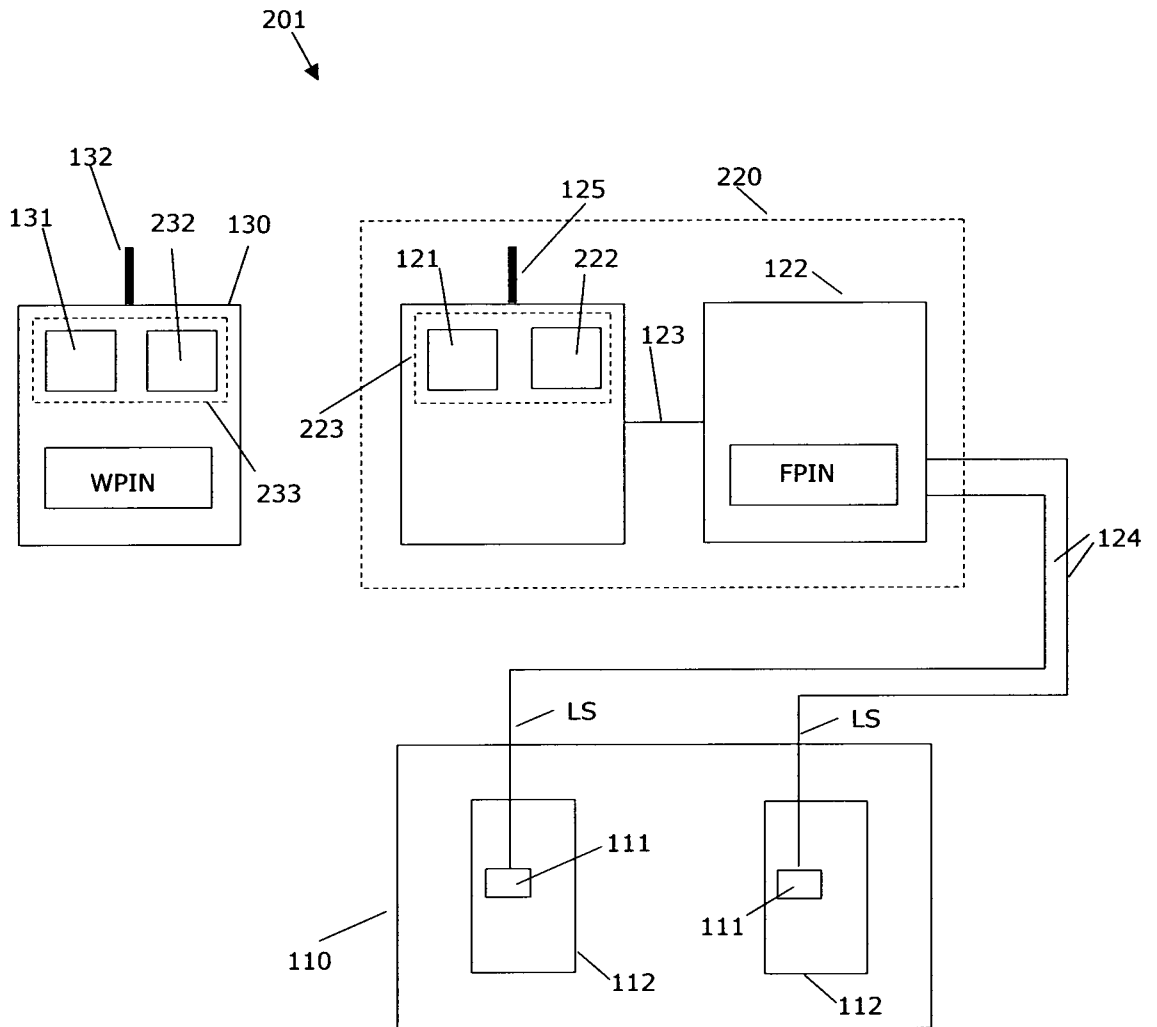


Fig. 2

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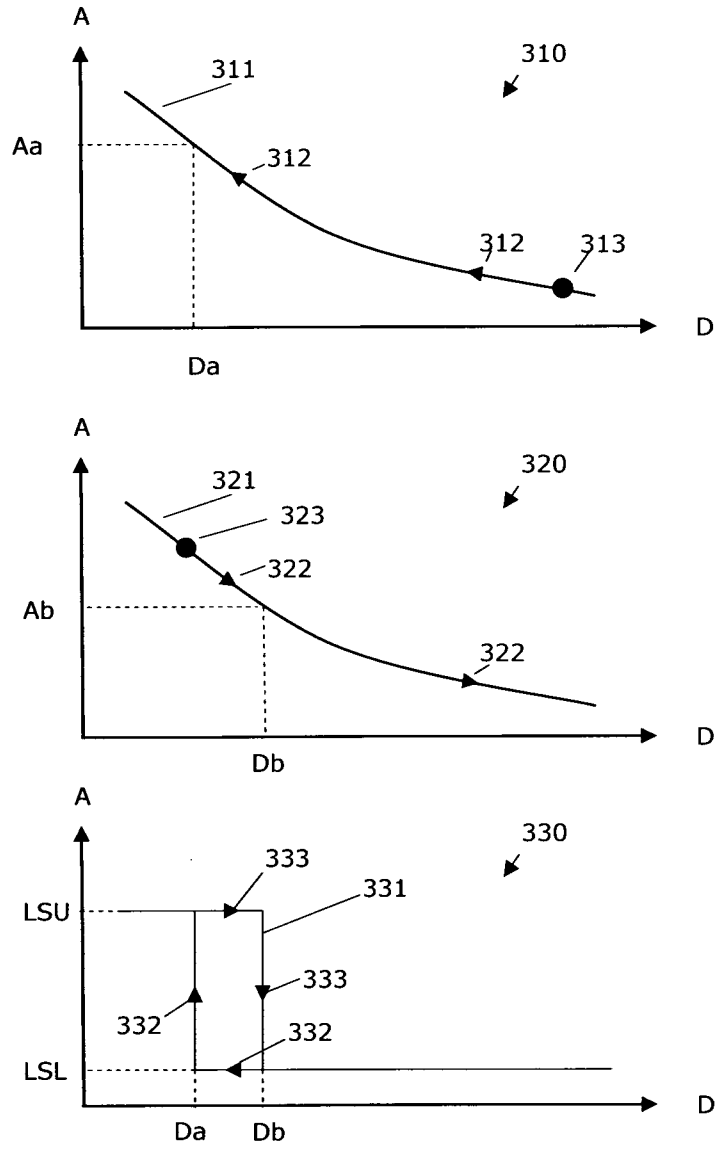


Fig. 3

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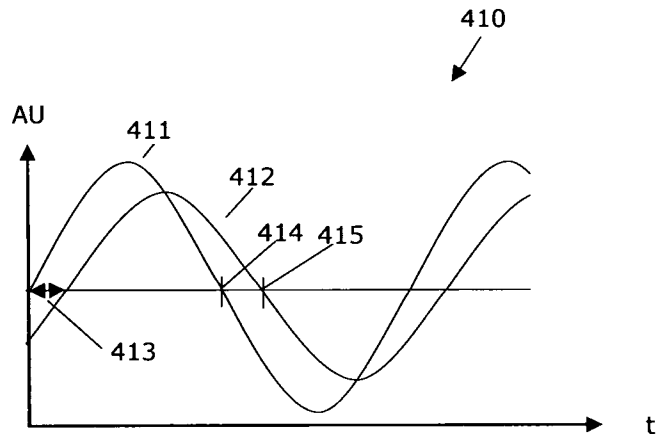


Fig. 4