

PERSONAL STORAGE UNIT WITH REMOTE ACCESS CONTROL

FIELD OF INVENTION

[001] The present invention relates generally to the field of goods deposit and storage systems, and in particular, to a personal storage unit and method for facilitating delivery and or collection of transported goods such as parcels, laundry, grocery and personal items.

BACKGROUND OF THE INVENTION

[002] Ordering of goods to be delivered to the user's place of residence is commonplace amongst consumers in Asia, North America and Western Europe and is a rising trend across the world. Cross-border shopping in particular is on the rise, driven by the global proliferation of mobile smart phones and tablets and rising power of e-tailers (retailers that sell goods via electronic transaction with no physical retail space).

[003] The increase of online purchasing naturally leads to an increase in frequency of delivery and collection of goods. In contrast to regular mail, goods deliveries typically require a representative to be physically present at the given address to accept delivery or to facilitate collection. This is inconvenient to consumers who are not at home during office hours. Special arrangements or absence from work might have to be made or taken to receive deliveries.

[004] In addition, deliveries or collection timing are not exact and usually a time range is available for selection by the consumer. An appointed representative will have to be physically present at the delivery address for the entire duration of delivery time. Unforeseen circumstances such as bad weather can cause deliveries to be delayed beyond the pre-arranged timing or postponed. This results in further inconvenience to all parties, in particular when fresh arrangements have to be made to reschedule the delivery. Furthermore, delay to a delivery can result in a snowballing effect that affects the timing of all subsequent deliveries.

[005] Generally, with the agreement of the consumer, it is possible for deliveries to be made where no representative present to receive the goods. Conscientious delivery staff will try to leave the goods in a location that is less visible to the public. However, goods delivered this way are generally left unsecured at the delivery address, which can possibly induce theft.

[006] Various solutions to the delivery problems described above have been developed. Many of such solutions involve one or more electronically-controlled lockers to facilitate the delivery and pickup of goods. These lockers are placed either outside common areas serving more than one apartment block or commercial establishments where there is high human traffic. Such lockers are essentially computer operated locker systems with embedded proprietary operating systems, a processor with constant connectivity to the internet and often a graphical display panel. The power that such lockers consume during operation require them to be plugged into a power source as well as the requirement for constant connectivity to internet limits the placement of such units. In some cases, these lockers are stand-alone systems that serve only specific merchants or users. In some of these systems, the lockers are communicatively linked to a central controller that is shared by a variety of merchants and users. Notification messages are transmitted to the receiving party to inform them of the need to pick up their deliveries. Operators of such lockers may impose rental charges for the use of such lock. Alternatively as such communal lockers handle a significant number of items daily, a deadline is imposed on the recipient to collect the item, otherwise the item will be removed.

[007] Delivery service providers have also partnered with commercial establishments such as convenience stores to offer services for depositing and collection of parcels. Consumers that are working during office hours also instruct deliveries to be sent their office address so that they are present to receive deliveries. However, this practice may not be accepted in certain companies. These work around solutions as well as the previously described common locker system effectively requires the consumer to be responsible for transport of the delivery item to its final destination which defeats the last-mile delivery service that the delivery service is supposed to provide.

[008] Both communal storage locker and partnering shops as collection points are also restricted by the opening hours of the establishments where the locker or shops are situated. If these are situated in a mall, they are restricted by the opening hours of the mall.

[009] There is thus a need for a solution that does not require the presence of the consumer or his representative to receive delivery or collection of goods at the intended delivery address. This allows completion of delivery or collection at all times and eliminate any waiting time/ delay for all parties involved, thus making the delivery or collection process more efficient. Preferably, the goods delivered or to be collected are secured in dedicated storage unit, without

the need to give access to the actual premises. Since the storage unit belongs to the user, no usage fee is charged nor deadline is imposed by the recipient to remove the delivered items. The system that manages and control the storage unit is web-based and the storage unit does not require complicated electronics or circuitry, access to the internet nor plugged in to the mains. The storage unit operates simply through unlocking instructions generated from a user's web enabled device. Details of the deliveries or collection can be remotely created and viewed on user's web enabled devices.

SUMMARY OF THE INVENTION

[0010] The following presents a simplified summary to provide a basic understanding of the present invention.

[0011] The present invention relates to an electronic personal storage unit which is secured at a location that provides the greatest convenience for the delivery and pick-up of deliveries to the users. The users may be occupants of a household that regularly orders goods to be delivered to their address or an e-tailer that repeatedly arranges for pick-up of their goods for delivery to their customers. The storage unit is envisioned to be placed next to the main entrance of a residential unit or warehouse of an e-tailer or other premises of convenience to the user.

[0012] Parcels ready for collection can be deposited by the user into the compartments of the storage unit, while deliveries can be made to the user by depositing the deliveries into the compartments of the storage unit. With the present invention, the occupant of a household or his appointed representative does not need to be physically present during a scheduled delivery and an e-tailer does not need to be physically present to hand the parcel to the delivery man. The delivery man can conduct deliveries or collect the parcels any time of the day, and not be restricted to the working hours of the staff of the e-tailer or periods when the occupants of a household or his appointed representative are present.

[0013] The electronic personal storage unit may have one or multiple storage compartments, each with an electronic controlled release operated door latch in communication with a central control unit. The door latches can receive and send signals to communicate with the central control unit which controls the deactivation of the locks.

[0014] An online storage unit management system comprising storage unit management module, access code generator, end user module and database is designed to remotely operate a plurality of electronic personal storage units. Each storage unit is a unique record in database and may be identified by its unique identifier such as a QR code that is prominently displayed on the exterior of the storage unit.

[0015] When a delivery or collection is arranged, the owner or an authorised user of a storage unit enters information relating to such activity on the storage unit management module, creating an event associated with the storage unit. An access code generator generates an access code for the particular event to unlock a storage compartment selected for the event. The owner or authorised user of the storage unit relays the access code to the party that is responsible for performing the delivery or collection.

[0016] When the delivery or collection person arrives at the delivery location, he accesses the end user module through various means such as a handphone app via a mobile device connected to the internet and sends information to the end user module about the storage unit using its unique identifier.

[0017] The central control unit is adapted to wirelessly receive or transmit data to a mobile device of the delivery or collection fulfilment personnel. Once the storage unit is identified, the end user module accesses the current data of the personal storage unit from the online database. The delivery or collection person is then prompted by the end user module to enter the access code that earlier has been provided. The end user module performs a validation check against the current data to establish whether the access code and the date and time of the input of such access code is in line with the unlock requirements of the storage unit.

[0018] Upon successful validation, the end user module generates an unlock instruction that is wirelessly transmitted via the mobile device to the central controlling unit. Based on the information of the unlock instruction, the central controlling unit relays an unlock signal to the relevant electronic controlled release operated door latch to unlock the relevant storage compartment. When the delivery or collection person has completed his intended delivery/collection, the door of the relevant storage compartment is closed, triggering a signal from the door latch to the central control unit, which is wirelessly sent to the end user module via the mobile device of the delivery or collection person and updated and saved in the database as a record in the event log of the storage unit.

[0019] In accordance with an aspect of the invention, there is a web-based system for remotely managing an electronic personal storage unit having one or more compartments comprising:

- a storage unit management module for remotely managing access to each of the one or more compartments of the personal storage unit;

- an access code generator for generating a unique access code corresponding to a valid scheduled compartment access;

- an end user module for generating unlock instructions for access to the one or more compartments of the personal storage unit, in response to a valid input by an end user

wherein the electronic personal storage unit includes one or more electronic locks for controlling access to one or more compartments of the personal storage unit, each of the one or more electronic locks including input means for receiving an unlock signal and a central control unit for receiving said unlock instructions and relaying corresponding unlock signals to the one or more electronic locks.

[0020] A method for facilitating transfer of goods for delivery or collections in an electronic personal storage unit having one or more storage compartments, said method comprising the steps of:

- registering information of a delivery or collection event in an online database by a user with management rights of the personal storage unit;

- remotely generating an access code unique to the said delivery or collection event;

- providing to the responsible delivery or collection party, said unique access code;

- remotely receiving an access code input provided by said delivery or collection party;

- remotely verifying of access code and supplementary end user supplied data against data of said delivery or collection event stored in said online database;

- remotely generating an unlock instruction upon successful remote verification of said end user supplied data and access code for unlocking said electronic person storage compartment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] This invention will be described by way of non-limiting embodiments of the present invention, with reference to the accompanying drawings, in which:

[0022] FIG. 1 is an interior and exterior perspective view of an exemplary electronic personal storage unit and schematics showing remote access of the storage unit compartments by an end user

[0023] FIG. 2 illustrates an exemplary network information flow diagram according to embodiments described herein

[0024] FIG. 3 illustrates an exemplary flow diagram for granting temporary access to a storage compartment for delivery / collection

DETAILED DESCRIPTION

[0025] One or more specific and alternative embodiments of the present invention will now be described with reference to the attached drawings. It shall be apparent to one skilled in the art, however, that this invention may be practiced without such specific details. Some of the details may not be described at length so as not to obscure the invention. For ease of reference, common reference numerals or series of numerals will be used throughout the figures when referring to the same or similar features common to the figures.

[0026] FIG 1 is perspective view of an exemplary electronic personal storage unit **100** having three storage compartments of equal dimensions. The dimensions of the storage compartments do not need to be identical. For example, the personal storage unit **100** may include a long and narrow storage compartment to receive clothes from the dry cleaners. The personal storage unit **100** is meant to be securely mounted at a location of greatest convenience to the owner, such as next to the front door of the owner's residential unit for secure delivering and retrieving of deliveries. The storage unit **100** may be secured to the premises by conventional means.

[0027] Each storage compartment has an access door **20** which can be locked/unlocked by an electronic controlled release operated door latch **30**. The door latches **30** are adapted to be in communication with a central control unit **40** of the personal storage unit **100**, preferably wirelessly. The central control unit **40** is a passive device adapted to receive unlock instructions and send corresponding unlock signals to the door latches **30** and conversely to receive lock

signals from door latches **30** and wirelessly transmit corresponding lock information. Central control unit **40** is best operated with batteries, and preferably has the ability to jump start if the battery is flat. It may come with low battery warnings and indication, either physically at the storage unit or via the storage unit management module. The default state of doors **20** is locked. The personal storage unit **100** is labelled with its unique identifier, represented by a QR code **50**.

[0028] During initial setup, the owner of the electronic personal storage unit **100** registers himself as a master user of his storage unit **100** by accessing the web-based storage unit management module and inputting his electronic personal storage unit's unique identifier as well as his personal information including name, contact number, email address, physical address where the storage unit **100** will be installed. For security, a password will be required for subsequent access to the storage unit management module. Various functions in the storage unit management module allows the master user of the personal storage unit **100** to manage and operate his unit. Such functions includes creation/deletion of sub master user accounts which are tagged to unique email addresses, assigning selected storage compartments that can be used by a particular sub master user.

[0029] As shown in FIG 2, there is a web-based storage unit management system having a storage unit management module having at least one server, the at least one server arranged in data communication with a user web enabled device, for users to control rights to the storage unit (such as the owner of the unit), an end user module predominately for temporary access to compartments of the storage unit by collection/delivery personnel, an access code generator and a database for storage of and access to records and logs of all physical storage units managed through the system.

[0030] The storage unit management module is used to manage the access of electronic personal storage unit **100**. Since the storage unit management module enables the creation of a master user and sub master users for each personal storage unit **100**, one electronic personal storage unit can be used or managed by multiple users. For example, for a household that owns an electronic personal storage unit **100**, one member of the family may register himself as a master user and create sub master accounts for the remaining individual members of the family. Only the master user has administrative rights, such as creating or deleting sub master users, and allocating the specific compartments that a particular sub master user can use. Sub master users do not have administrative rights, but have rights to manage access to the compartments of the personal storage unit to facilitate their own delivery/ collection orders.

[0031] Referring to FIG 3, when a master user or sub master user orders items for delivery or arranges for a collection from his address, he accesses the storage unit management module using his PC or mobile phone connected to the internet and creates a new event for the activity. This may be performed via a schedule/calendar interface that displays a calendarised view of the availability or non-availability individual compartments that also permits the creation of new events. When a new event is created, the master user or sub master user is prompted to enter required parameters of the event such as short description, date, time frame of activity, setting it as a once off or recurring event, the selected compartment based on availability and size. An access code associated with the event is automatically generated by the access code generator upon successful creation of a new event. Amendments to various parameters relating to the event can be made by the creator of the event via the storage unit management module without requiring the passcode to change.

[0032] Through the delivery or collection order placement system or other messaging means, the user provides instructions on the use of the electronic personal storage unit and the generated access code to the delivery / collection fulfilment service provider.

[0033] For security purposes, the delivery / collection fulfilment service provider is required to register an account via the end user module. This allows the service provider to be identified when accessing the end user module to deliver or collect an item from the personal storage unit **100**.

[0034] When the delivery / collection fulfilment service personnel arrives at the delivery address, the personnel first uses his internet enabled device, such as a mobile phone to access the end user module. Through the end user module interface, the collection/delivery personnel initiates an unlock function that activates the camera of his internet enabled device to scan the QR code **50** displayed on the storage unit **100**. When a QR code is scanned, information about the storage unit **100** stored in the QR code is decoded and the end user module attempts to match the information of the storage unit **100** against the system's online database records. When a match is found, the storage unit is identified and the personnel is prompted to enter an access code. The end user module then performs verification of the access code entered, the time and date when the access code is entered against relevant event data of the identified storage unit stored in the online database. Upon positive verification, the end user module

initiates the internet enabled device to generate an unlock instruction signal that is wirelessly transmitted to the central control unit **40** of the identified storage unit **100**.

[0035] The central control unit **40** controls access to the individual storage compartments. The central control unit **40** is adapted wirelessly receive unlock instructions signals from an end user internet enabled device and send corresponding unlock signals to individual door latches to unlock the door of the storage compartments. After the delivery / collection personnel has attended to the required activity and shuts the door, locking the compartment, a lock signal is generated by the electronic door latch, transmitted to the central control unit **40** and wirelessly relayed to the internet enabled device of the personnel. The signals are preferably radio wave signals and the wireless transmission mode may be Bluetooth standard. The lock signal and supplementary information such the time and date when the specific compartment is locked is logged in the online database. When the event is an arrangement to collect of items from the master or sub master user, the compartment lock log indicates completion of the event. When the event is a delivery to the master or sub master user, the event is registered as completed in the system only after the user who has created the event or an appointed has retrieved the delivered item. The status of the relevant compartment is set as “unavailable” until the pending event is registered as completed.

[0036] Via the storage unit management module, the master or sub master user that created the event can view the status of the delivery / collection. Alerts may be generated to notify the relevant master or sub master user during the completion of an event. If a delivery was made to the master or sub master user, he may at his convenience retrieve the delivery by opening the door of the relevant compartment via the storage management module. By logging into the storage management unit module, the module will recognise the user and generate the appropriate unlock instructions to unlock the relevant compartment. The status of the storage compartment remains ‘unavailable’ in the database until the delivery is collected by the master or sub master user. In the case of collection, the storage compartment status reverts to ‘available’ once the collection personnel has collected the item and closed the door of the compartment.

[0037] The web-based storage unit management system eliminates the need for elaborate electronics to be installed at the storage unit. For example, there is no need for a display screen to be installed to the storage unit, as the end user module and storage unit management

module are accessed through web enabled devices such as a mobile phone. The storage unit does not require direct or constant connectivity to internet nor a processor which takes up a lot of power. The storage unit only sends and receives signals through low power consumption wireless mode, such as Bluetooth, which can be powered by conventional batteries. There is also no requirement for the installation site to supply internet connectivity. Since the physical storage unit operates without the need for a power point and internet connectivity, installation of the unit is straightforward process. The storage unit can be easily deployed and used in a wider range of locations.

[0038] A sensor at the compartment door or alternatively a countdown timer in the end user module or storage management module can be used to detect if the door of a compartment has been left open too long (eg. >3mins) and activate a beeping device in the storage unit to alert the party that has unlocked the door. Similarly, an anti-tampering sensor can be added to the storage unit which on detection of sudden or jerky movements activate a beeping device. It is also beneficial to include some form of sensor or visual capture to confirm the retrieval or presence of items in the compartments. Visual captures can be performed by a small camera installed within each compartment that can record and wirelessly transmit visual images of the interior space of the compartment. Weight sensors, or infra-red sensors may alternatively be included in the storage unit to detect if any items are present in the compartment. Depending on the needs of the user, specialised compartments such as temperature regulated compartments may form part of the storage unit.

[0039] While specific embodiments have been described and illustrated, it is understood that many changes, modifications, variations and combinations thereof could be made to the present invention without departing from the scope of the present invention.

CLAIMS

1. A web-based system for remotely managing and accessing a plurality of electronic personal storage units, each unit having one or more compartments, the web-based system comprising:
 - a storage unit management module for managing scheduled access to each of the one or more compartments of an electronic personal storage unit, the scheduled access being a defined period of time specified by the owner or an authorised user of the storage unit for an end user to access a selected compartment during such defined period of time;
 - an access code generator for generating a unique access code corresponding to a valid scheduled compartment access created by the owner or an authorised user of the storage unit;
 - a database for storing and accessing data relating to scheduled access of the electronic personal storage unit; and
 - an end user module for generating unlock instructions for access to the one or more compartments of the electronic personal storage unit, in response to a valid input by an end userwherein the electronic personal storage unit includes one or more electronic locks for controlling access to one or more compartments of the personal storage unit, each of the one or more electronic locks including input means for receiving an unlock signal and a central control unit for receiving said unlock instructions and relaying corresponding unlock signals to the one or more electronic locks.
2. The system of claim 1, whereby validation is performed against data relating to said scheduled storage access of the electronic personal storage unit stored in the database.
3. The system of claim 1 or 2, whereby the storage management module and end user module are accessible using an internet enabled device including mobile phone.

4. The system according to claims 1-3, whereby each electronic personal storage unit is a unique record in the database, the unique record represented by a QR code displayed on the storage unit.
5. The system according to claim 4, whereby the end user module activates a QR code scanner function in the user's internet enabled device for scanning the QR code and the module verifies the scanned information against relevant information in the database.
6. The system according to claims 1-5, whereby the valid input is derived from user input of the unique access code and time and date of the input.
7. The system according to claims 1-6, whereby the default state of the compartments is locked.
8. The system according to claims 1-7, whereby a master user and sub master accounts for a electronic personal storage unit are created using the storage unit management module.
9. The system according to claims 1-8, whereby the electronic locks generates a signal to the central control unit when the associated door of the storage compartment is closed.
10. The system of claim 9, whereby the central control unit wirelessly transmits information relating to closing of a storage compartment via the user's internet enabled device to the end user module for recording in the database.
11. The system according to claims 1-10, whereby users of the end user module are required to pre-register an account.
12. The system according to claims 1-11, additionally provided with a sensor that monitors the duration of the opening of the compartment door that activates an alarm accordingly to a pre-determined threshold.
13. The system according to claims 1-12, additionally provided with anti-tampering sensor that activates an alarm according to a detection of sudden or jerky movements.

14. The system according to claims 1-13, additionally provided with sensors to detect the presence of items in each individual compartment.
15. The system according to claims 1-14, whereby one or more compartment is temperature regulated.
16. The system according to claims 1-15, whereby the electronic personal storage unit is operable without the electronic personal storage unit having inbuilt internet connectivity.
17. The system according to claims 1-16, whereby the electronic personal storage unit is operable without the electronic personal storage unit having an inbuilt processing system to run the storage unit management module or the end user module.
18. The system according to claims 1-17, whereby the electronic personal storage unit is operable without the electronic personal storage unit having an inbuilt display monitor.