

Computerized, Modular-Designed, Temperature-Controlled, Parcel-Securing, Parcel-Preserving, Internet of Things (IoT) Device and Management System.

Classification

A HUMAN NECESSITIES

A47 FURNITURE; DOMESTIC ARTICLES OR APPLIANCES; COFFEE MILLS; SPICE MILLS; SUCTION CLEANERS IN GENERAL

A47G HOUSEHOLD OR TABLE EQUIPMENT

A47G29/00 Miscellaneous supports, holders, or containers for household use

A47G29/141 Deposit receptacles for food, e.g. breakfast, milk, or large parcels; Similar receptacles for food or large parcels with appliances for preventing unauthorised removal of the deposited articles, i.e. food or large parcels comprising electronically controlled locking means

Description

TECHNICAL FIELD

This invention relates to parcel receiving, securing and preservation systems and methods.

This invention relates to parcel securing and management IoT devices and systems.

BACKGROUND OF THE INVENTION

In recent times, better cybersecurity pertaining particularly to online transactions, the growth of user-centric digital platforms and marketplace as well as innovations in third party logistics (3PL) last mile delivery systems have created **unprecedented online consumption of goods and services** especially in cities with good infrastructure and, at the same time, density-high residential; industrial and commercial population clusters like those that can be seen in Singapore, Hong Kong, Japan and New York.

The greater demand for a support system that enables online consumers to receive their online purchases in the form of parcels at their residential or commercial vicinity is evident in the emergence of **self-collection electronic lockers** dispersed throughout the City of Singapore.

Online food delivery services are also booming as crowdsourcing, the development of a gig-economy and the growth of various urban delivery systems and the evolution of the short-distance cycle courier industry that curbs the effects of traffic gridlock in high density urban developments. Lifestyle changes and shifting perceptions with regards to dining options of dual or multiple income families means more food are delivered via these food services to homes and offices.

Online grocery shopping is also an emerging trend as mobile technologies and software applications allow urbanites to adopt time-saving measures to handle the mundane and routine task of procuring recurrent consumables that is inclusive of **perishables** and Fast-Moving Consumer Goods (**FMCG**).

The main concerns for the matter of parcel delivery, *pertaining to e-commerce*, is multi-faceted and affects **three major parties** involved in the process namely:

- I) **Third Party Logistics (3PL) Providers** (performing last mile delivery services)
- II) **Consumers**
- III) **Merchants**

The invention attempts to address four (4) major concerns, namely:

A) The problem of preservation and protection of various types of parcels

The problem of protection and preservation is primarily the problem of delivered parcels left at the porch, doorway or gateway unreceived and unattended. The longer the exposure, the higher the risk for **parcel theft, damage or deterioration** of the parcel from its original condition upon arrival.

The invention will attempt to hold, secure and preserve parcels of various value; parcels of various sensitivity to ambience temperature and parcels with various rates of decay within a suitable environment until the authorised personnel retrieves it following the authentication process. The invention will be suitable to cater to parcel types that could include but is not limited to cooked and uncooked food, perishable groceries and medicine that are not suitable to be left exposed. It could also be suitable for parcels of high value.

The invention attempts to solve the above problem through a temperature-controlled, automatically lockable receptacle that insulates the parcel from undesirable elements, human or otherwise.

B) The problem of efficiency in the fulfilment process

The problem with efficiency pertains partially to merchants but mainly to 3PL service providers acting on behalf of the merchants in getting the purchases, in the form of parcels, to their intended final destination. As time is wasted

When parcel deliveries are made either by human deliverers, autonomous delivery robots, or unmanned aerial vehicles (UAV) from a distribution node to the final destination defined by the recipient, there is often the issue of the absence of a recipient, authorized or otherwise.

Certain deliveries require that buyers, or a proxy recipient, are at destination to receive the parcels. It could be that the value of the parcel is high, or that the items are best not exposed to the elements of nature or exposed to the risk of theft (E.g. In the case of food, medicine or high value merchandize).

When authentication and / or proof of delivery is required or desirable, It becomes costly to the 3PL companies in that time and money are expended, upon the failed attempted delivery, for redeliveries of the same parcel at a later time, rerouting of the parcel to a separate location or just waiting for a recipient to turn up.

The invention will solve this problem by being a 24/7 proxy recipient for the authorized recipient, to receive parcel at the vicinity of the final destination. As such that deliverers can go through the authentication process, perform a parcel drop-and-go and be able to keep their schedule.

C) The problem of accountability

The problem of accountability relates to the accountability for delivery and receipt of the parcel at its intended destination. In the case of partial deliveries, which refers to deliveries made without proper verification of receipt from a recipient, there is uncertainty and ambiguity with regards to the status and condition of the parcel. In the case that unsatisfactory results arise from these unverified deliveries, (E.g. stolen or damaged parcels), it will be unclear who is accountable for those results.

On the other hand, merchants will face complications when a failed or missed delivery occur(s). In the case of missed delivery due to the absence of a recipient at destination or the fact that the deliverer has missed the assigned delivery timeslot, more time is taken to close the transaction loop. In most cases, this means that merchants, especially those operating via an online platform or virtual marketplace, will not receive payment since a successful delivery have not been accounted for. In the case of partial (unverified) delivery, merchants will also get a delay in payment when customers do not confirm the receipt of their parcels after receiving them.

The invention will attempt solve the problem of accountability by recording and reporting a successful delivery that is being made to all relevant parties involved.

D) The problem of inconvenience

The problem of convenience is basically the submission to the “tyranny of time and space” on the part of the customer when they are required to be present to receive a parcel at an assigned timeslot that could span various ranges. On the part of the recipient, when there is uncertainty about the exact delivery time, it could prove to be problematic when scheduling a timing to be present for the receipt of the parcel.

In the case of food deliveries, at the risk of exposure to parcel theft natural elements and insect invasion, consumers often hesitate to order in advance not knowing if they would be delayed reaching the designated location of the delivery to receive the food in time.

The requirement to be at the door can also pose challenges even when recipients are on location to receive the parcels since recipients could be engaged in activity upon the arrival of the deliverer and the parcel.

The invention will solve the problem of inconvenience to the consumers by relieving them from the necessity to be at a given place at a given timeslot to receive items due to be delivered by holding, securing and preserving them within a suitable environment.

SUMMARY OF INVENTION

To address the aforementioned issues in the background, a physical parcel-handling device is needed to address the four (4) major concerns of the three (3) major parties concerned in the delivery and receipt of parcels.

The parcel-handling device basically allows deliveries to be received at a destination from an authorized deliverer, regardless of whether or not a human recipient is present on location. Acting as a proxy, the device provides a secure and well-protected holding chamber and adjusts the ambience temperature, when

necessary, according to the requirements of the parcel type until such a time that a human recipient can receive it.

The invention described here is a computerized, modular-designed, temperature-controlled, parcel-securing, parcel-preserving, internet of Things (IoT) device and management system that could allow deliverers to efficiently and reliably deliver parcels and for authorized recipients to conveniently receive said parcels, at liberty, and in the original condition upon delivery.

The major aspects of the device consist of:

- 1) A “head module” that acts as the master controller and power relay for the main and optional receptacle units.
- 2) A main receptacle composing of a temperature controlled, thermal-insulated chamber capable of ambience cooling and heating. Optional receptacle units could be attached and secured to the bottom of the main receptacle via a docking connector unit which facilitates device-to-device communication and energy relay. An automated push-lift upward-sliding door. with a window and switchable privacy smart screen, acts as the gateway control and threshold-setting mechanism.
- 3) A housing serves as protection against tampering and the elements of nature. The housing also serves as an aesthetic piece that aids product personalization and accessorization.
- 4) Electronical components such as LED, LCD Screen, Speakers facilitate device-to-human interfacing and interaction.

The aforementioned device is designed to function best at the **proximity** of the **gateway** or **doorway** of the intended final destination.

The design of the aforementioned device, with its various electronic and mechanical components, operating modules and its software and programs, are devised to solve the aforementioned category of problems.

In one embodiment, the device consists of a “head module” acts as a master controller to the main and optional receptacle attached via a docking connector unit. The “head module” also acts as the interactive module that will interact with parcel deliverers and recipients for the purpose of communication, authentication, and purpose serving.

In yet another embodiment, the device consists of a main receptacle with a chamber assembly, door handler assemblies on either side of the chamber, and a door assembly.

In yet another embodiment, the device consists of a docking connector unit that serves to facilitate communication and power transmission between the “head module” and the receptacle(s).

In yet another embodiment, the device consists of a communications module that will facilitate human to machine communication and vice versa. Said communication module will also facilitate machine to machine communication.

In yet another embodiment, the device consists of “skins” for the purpose of aesthetic embellishment, the personalization of each individual device and finally for visual identification.

In yet another embodiment, a housing made of plastics that is splash-proof, fire-retardant and weather resistant serves to provide protection for the mechanical and electronic contents, as well as the chamber and its content.

In yet another embodiment, anthropomorphism elements in the exterior design, partially through the “skin” and Artificial intelligence (AI) are used to give the parcel-handling device “life” and the ability to “express emotive states”. This is achieved through incorporating functions that supports and prompts interactivity, soft AI that aids communication to the IoT device.

In yet another embodiment, the parcel-handling device has a device-securing anchoring device for which to secure the parcel-handling device assembly to an immovable anchor point.

In the facilitation of last-mile delivery, the parcel-handling device is capable to:

Provide computerized identification through an authentication process to facilitate delivery to the intended location.

Provide notification to the relevant parties prior to delivery, after successful delivery, after failed delivery attempt; after unauthorized delivery attempt and after collection from authorized recipient.

Allows communication of one-time password (OTP) code or the activation of near field communication (NFC) devices for authentication purposes.

Creates a log for all relevant processes pertaining to the last-mile delivery of the parcel.

DESCRIPTION OF DRAWINGS

FIG. 1A is an illustration of the device (codenamed BOXY) assembly. It lists the various major part assemblies. A bottle of wine in the interior provides the context for the kind of parcels that the receptacle could possibly hold.

FIG. 1A-1 is an illustration of the door assembly. It features a window that is retrofitted with an electronically switchable privacy film

FIG. 1A-2 is an illustration of a door handler assembly with descriptions of the various parts and assemblies that it comprises of. Within the door handler assembly is a door lock assembly and a lifter mechanism that aids in the upward and downward sliding motion of the device door.

FIG. 1A-3 is another illustration of the door handler assembly from the back and side perspectives.

FIG. 1A-4 is an illustration of the door lock assembly

FIG. 1A-5 is an illustration of the door lock assembly in its “exploded” perspective revealing the various components that it comprises of.

FIG. 1B is an illustration of the “head module”. It lists the various major components that it comprises of.

FIG. 1C is an illustration of the chamber assembly.

FIG. 2A is a schematic drawing of the chamber control module. Raspberry Pi 3B+ is the microprocessor used. Control signals for lateral and vertical movement from the microprocessor to the motor driver module via

the use of transistors. Input from limit sensors will determine the cut off of the control signals when the door assembly reaches the ideal positions. Chamber assembly lighting is also controlled via the use of MOSFET.

FIG. 2B is a schematic drawing of the Peltier control module. Heating and cooling is achieved with control signals to a relay that control power supplied to the Peltier and fans.

FIG. 3A is a descriptive illustration of the worm and worm gear mechanisms in “exploded” perspective that serves to describe the self-locking mechanism.

FIG. 3B is an illustration of the receptacle chamber equipped with dual Peltier devices.

In FIG. 3C is a user interface of the device illustrating the various commands that users could access and remotely control the device.

DETAILED DESCRIPTION

A parcel receiving, securing and preserving, Internet of Things (IoT) device of Figure 1A is installed at a user's receiving location. In some embodiments, the device, hereon referred to as the parcel-handling device, is installed near the exterior wall of a residential, commercial or industrial unit, for example, a flat, an apartment, a condominium, a landed property. For example, the package receiving device Fig 1A can be placed on a platform and secured via a anchoring device, consisting of a retractable steel cord, to an anchor point at the wall. In another example, it could also be secured to an immovable gate at the door. The device is generally designed to be used at the space between the public and private domain of a piece of real estate property.

From FIG 1A, it can be seen that the device consists of a “head module” (No. 7) that will serve to be main interfacing module on-location. An LCD touchscreen will serve to display various information that could be instructions, warnings, greetings and just plain information regarding the status of its various sub-devices and components. The LCD display can also function as a video-conferencing tool for users to remotely communicate with on-location deliverer. The “head module” basically serves to contain the main computing components including the microprocessor unit(s) and a **communication module**, that further comprise a **network module**, **authentication module**, **interactivity module**, **interfacing module** and **sensory module**, to facilitate the various device functions.

Below the “head module” is a main receptacle further comprising of a chamber assembly and individual door handler assemblies on each side of the chamber. The door handler assemblies act as a door opening mechanism and also as a door locking mechanism and is linked to and controlled by the “head module” via its various communication sub-modules.

The abovementioned receptacle further comprises a door assembly that has an electronically switchable privacy film adhered to its door window for a multitude of purposes. One of the purposes could be for the maintenance of privacy from external parties with regards to the contents of the chamber when it is occupied. Upon the arrival of parcels on location, the privacy film could change its opacity to transparent to indicate, together with illuminating devices, to the deliverer which are the designated receptacle and chamber for use.

It should be noted that the door opens with an upward sliding action which is in essence a two-step procedure of horizontally and vertically linear movement. Similarly, the door shuts with a downward sliding action. This ensures that the depth and width of the device and its receptacle remains compact regardless of the position of the door. This ensures that in the operation of the device receptacle and its doors, the space around it,

which could include building corridors that in some cases require a 120 cm wide clearance for evacuation purposes, to be unobstructed by an open door.

The installed parcel-handling device of FIG 1 is designed to communicate remotely with users, authorized recipients and delivering parties via a cloud-based communication network. This back-end system is connected to the cloud via WIFI network router that is within the vicinity of the intended installation location. Alternatively, a subscriber identification module that enable connection to a mobile, telecommunication network of various generations (3G, 4G, 5G, 6G etc), that will further aid communication with aforementioned users, authorized recipients and delivering parties through the use of their mobile devices or personal computers.

In the communication module within the “head module” (7) of the parcel-handling device in FIG 1A data can be transmitted, in terms of being downloaded from and uploaded to a cloud server. In the back-end system and server utilized by the communication module, data downloaded to the device could consist of information from 3rd Party Logistic (3PL) companies about the parcel to be delivered and its tracking. The information could also consist of information from seller regarding parcel composition and details. The information could also consist of instructions or requests from a remote user who have administrative access to the device. The data uploaded could consist of information gathered by the device via its sensory module. The information could consist of visual data with regards to the chamber ambience. The information could consist of feedback from the system with regards to it's the performance of various systems and components, chamber status and also records of communication of any kind.

The communication module, back-end system and server can also allow the user to remotely control the device, the “head module” and its various receptacles via their mobile device or personal computer. For example, the user can send commands for the door to be opened or close. In another example, the user can also send commands for the Peltier devices to be activated to either cool or heat the chamber interior in anticipation of food and/or grocery deliveries. In another example, the user can also activate the LDC screen, the speaker and microphone features of the “head module” in order to initiate or receive a video conferencing session with a person(s) who is on location. In another example, the user can also put the device on forced “hibernation mode” for the purpose of energy conservation, and similarly reverse the command for forced hibernation. In another example the user can activate the electronically switchable privacy from partially opaque (“frosted”) to transparent and vice versa. They can use the privacy film feature together with the in-chamber camera in order to capture objects or external view just outside the chamber for whatever reasons such as identification or verification of temporarily assigned recipient.

FIG. 2A is a schematic drawing of the chamber control module. Raspberry Pi 3B+ is the microprocessor used. Control signals for lateral and vertical movement from the microprocessor to the motor driver module via the use of transistors. Input from limit sensors will determine the cut off of the control signals when the door assembly reaches the ideal positions. Chamber assembly lighting is also controlled via the use of MOSFET.

The communication module, back-end system and server run by an independent server-side program can also allow device to be managed autonomously for the purpose of self-maintenance and self-monitoring.

The parcel handling device's is designed to handle the final portion of the order fulfilment process. In order to adequately handle this task, they are best programmed to communicate with both e-commerce retailers as well as their delivery team or the 3rd Party Logistics (3PL) that they engage for the purpose of a seamless experience. Once a purchase has been made online, at any particular time, information pertaining to parcel details and its delivery status (e.g., tracking number, delivery date and time, parcel dimensions and parcel type and temperature requirements) can be acquired via our back-end system with access to retailer's or

3PL's application programming interface (API). With the aforementioned made possible, there can be real time updates on the parcel related information. As mentioned previously this gives the user a seamless online purchasing experience after the initial purchasing action have been committed on the e-commerce mobile platform or website. As such, the parcel handling device is a has "full proxy" capacity and potentially need not involve the user, or the intended recipient at any stage of the delivery process.

In another embodiment, the invention could be operating a Light Detection and Ranging (LIDAR) system for the remote sensing of an approaching an autonomous unmanned aerial vehicle like a delivery drone meant to make a parcel deliver to the appropriate receptacle. The LIDAR system together with other tracking devices and a software program pushing an authentication sequence could be used for the identification and authorization of drones making an authorized autonomous delivery to our parcel handling device.

As the delivering party approaches the device, the "head module" as seen in FIG 1A will be activated from a hibernating "sleep mode" to an active mode via electronic Passive Infrared (PIR) motion sensors that will cover a distance of at least 5 metres and a detection angle of 110°. In the event that the motion sensors are not active, commands can be given to the parcel-handling device to be activated by touching the LCD touchscreen that serves as the main interfacing module placed on the "head module"

In the instance that there is no API connectivity with retailers and/or 3PL companies, unsolicited delivery parties acting independently from any business association or software linkages with our invention can have the option of have their deliverer get an OTP from the user directly , or via visual instructions displayed on the LDC display and audio instructions communicated via the speakers. The instructional process will begin upon waking from hibernation mode upon the detection of a human presence and a positive verification process of the human presence as that of a parcel deliverer.

FIG. 3C shows an exemplary user interface that users will come to use when interacting with the device. On the top right of the interface, information regarding the ID, address, service subscription type pertaining to device utilization, door status, LED light status will be one display to the user. A One Time Password (OTP) generator is also available for use (in the case of administrator or user) in the case that one has to be created for a delivering party that does not have available an application programming interface (API) for system communication. The device "action commands" are communicated via the interface buttons under "*Get your BoXY to:*" These commands, activated by pressing the buttons, includes those for door opening and door closing for the delivery of parcels; door opening and door closing for the retrieval of parcels; control of the opacity of the electronically switchable privacy film adhered to the door window that allows, during its "clear" state, or disallow, during its "frosted" state, visibility of chamber interior; turning on and turning off of the LED lights within the chamber interior; the activation of the thermoelectric system for cooling or for heating as well as it's deactivation; and a stepwise door opening commands that separates the door horizontal movement "in-out" commands and the door vertical movement "up-down" commands.

The purpose of a sliding door, as opposed to a side-hinged, top-hinged or bottom-hinged swing door concept is such that the minimum space is needed in from of the device to cater to an opened door. As such safety clearance at corridors could better be achieved with this design as its lateral dimensions can remain compact be it at rest or in operation.

The door handler gets instructions from the "head module" to open and close the door of an intended device receptacle using a cryptographic key and wireless protocol or a subscriber identification module (SIM) card communication protocol.

The outer housing of the parcel handling device that house both the receptacle, the chamber and the electronical and mechanical components, further consisting of mountable devices for the attachment of ornamental “skin” case plates of various designs, textures and electronic functions for the purpose of aesthetic enhancement and personalization

Additional Uses

The parcel handling device is also used as a depositor for the user. The delivery process is thus reversed with the end-user being the deliverer to the device and the retailer or its appointed 3PL the authorized retrieving party. Variations could be in the form of services. In one example, the user could return problematic parcels to retailers via his method of depositing the parcel into his parcel handling device to be collected by authorized party, instead of going to the post office. In another example, laundry could be collected by laundry cleaning companies from the parcel handling devices. In another example, library books could be collected from the parcel handling devices by libraries-appointed handlers. In yet another example,

The parcel handling device is further fitted with a thermoelectric system for the cooling and heating requirements within the chamber internal ambience, controlled by the “head module” as can be seen in FIG 3B. The key component of the thermoelectric system is the Peltier device that could cool or warm the chamber ambience temperature simply by controlling the flow of the electrical current passing through the Peltier semiconductor. As such, the invention could hold and preserve grocery and frozen food (that is to be kept cold) as well as prepared food (that is to be kept warm) for an indefinite amount of time. With API in place, the device can cool or heat the chamber ambience in advance in anticipation of the temperature-sensitive parcel prior from their dispatch from the retailing or outputting party.

The speakers in the receiving device can also be used to provide audio reminder messages broadcast. For example, reminders to bring an umbrella when there is a rain forecast (such information can be transmitted from the back-end system 120 to the receiving device 100) when the motion sensor 114 senses that someone is leaving the home.

In FIG 1A-2, the illustration is of door handler assembly comprising of a door locking assembly for which to lock and unlock the windowed door seen in FIG 1A and 1A-1. The door handler further consists of a door lock assembly that allow the door to be self-locking at both open and closed positions to avoid human tampering of the device door. This is achieved through a self-locking method using worm gears and worm components present in the door lock assembly. A worm gearing self-locking method allows the door locking assembly to hold the position of the door when it is closed and when it is during horizontal linear movement. This will ensure self-locking after the door is closed without the need for an additional and separately programmed locking mechanisms. The worm gearing self-locking method is achieved by the interlocking the worm and the worm gear that prevents back-driving from occurring. Any attempt to apply prying forces when the door is closed and the interlocking gears static will be prevented as the worm gear, which is linked to the door, cannot drive the worm thus preventing unauthorized and unsafe opening of the door by external forces. Any attempt to reverse the direction of door closing or opening when the interlocking gears are dynamic will also be met with resistance for reasons mentioned earlier

The dimensions of the parcel handling device can be of varying dimensions. In one embodiment of the invention, the interior dimensions of the receptacle are 41cm in both depth and width and 22cm in height in order to accommodate a 15” pizza box and 23cm in height to accommodate a typical 700ml cup of beverage soft drink that is placed on top of a pizza box. Most upright food packaging can fit into a receptacle of this size. Bigger receptacle sizes are available with the optional variations available mainly for depth and height.

All information of transactions and activities can be recorded in a log that is automatically uploaded into a cloud-based server.

A number of embodiments of the invention has thus been described above. Nonetheless, it is understood that there could be modifications made that could allow the invention to serve its various function in different contexts and settings as long as they are made within the spirit and scope of the invention. Accordingly other embodiments are within the scope of the following claims.

CLAIMS (41)

Having thus described my invention, I claim:

1. A computerized, modular-designed, extendable, temperature-controlled package receiving, package securing, package preserving and package dispatching system comprising:
 - a) A package delivery unit consisting of a main receptacle and a “head module” that possess computing power.
 - b) A communication module configured to facilitate Internet of Things communication; said communication module enabling the various functions of the receptacle that include package and delivery information matching and verification; activity reporting, automation commands,
 - c) A docking connector unit for electrically and electronically connecting the “head module” to the main receptacle and for connecting the main receptacle to additional receptacle(s)
 - d) An anchoring device for which to secure the package delivery unit to an immovable anchor point.
 - e) A power source for which the package delivery unit will get its power.
2. The modular-designed, extendable, temperature-controlled package receiving, package securing, package preserving and package dispatching system of Claim 1 that is ergonomically designed to stand upright on any floor surface with the “head module” mounted via the docking connector of Claim 1c to the main receptacle.
3. The **main receptacle** of Claim 1a wherein the said receptacle consists of an **outer housing**, a chassis, a **chamber assembly**, a **motorized front-opening windowed door**, base plate and top plate.
4. The **outer housing** of Claim 3 further comprising of fire-retardant, splash-proof, water-resistant plastics and metals, wherein said plastics compose mainly of Polycarbonate (PC) and limited Acrylonitrile Butadiene Styrene (ABS) and containing brominated flame-retardant additives.
5. The **outer housing** of Claim 3 further consisting of mountable devices for the attachment of **ornamental “skin”** case plates of various designs, textures and electronic functions for the purpose of aesthetic enhancement and personalization.

6. The **motorized front-opening windowed door mechanism** of Claim 3 further comprising of two sets of corresponding and synchronised **door handler assemblies** on either side of the chamber assembly of Claim 3 that serves to lift a **windowed door**. Said door mechanism further comprising limit sensors that, based on the parameters set, controls the of the extent of the door opening.
7. The **windowed door** of Claim 6 further consisting of an electronically switchable privacy film adhered to the transparent plastic window of said door, with said plastic film capable of switching between transparent, translucent and opaque states upon electronic command given from the “head module” of Claim 1a.
8. The **door handler assembly** of Claim 6, further comprising of a **door locking assembly** for which to lock and unlock the **windowed door** of Claim 6. Said door handler further consisting of door lifter, door lifter base, door lifter top plate, support shaft, door guide, guide shaft, door holder, drive gear, lock shaft mount, drive rack, and support shaft. Said door handler assembly further consisting of one set of motor for horizontal linear movement and another set of motor for the vertical linear movement pertaining to said windowed door.
9. The **door locking assembly** of Claim 6 further comprising of a gear box, **worm, worm gear**, lock pinion, lock rack, rack mount, door lock, gearbox base, worm shaft, worm gear shaft, motor mount, stopper, spacers, parking lock mount and parking lock. **A worm gearing self-locking method** allows the door locking assembly to hold the position of the door when it is closed and when it is during horizontal linear movement. This will ensure self-locking after the door is closed without the need for an additional and separately programmed locking mechanisms.
10. The worm gearing self-locking method of Claim 9 is achieved by the interlocking the worm and the worm gear that prevents back-driving from occurring. Said worm gear is linked to the door via a worm gear shaft that is connected to a rack and pinion which serves to extend or contract the door guide that in turn horizontally moves the door. Any attempt to apply prying forces when the door is closed and the interlocking gears static will be prevented as **the worm gear, which is linked to the door, cannot drive the worm** thus preventing unauthorized and unsafe opening of the door by external forces. Any attempt to reverse the direction of door closing or opening when the interlocking gears are dynamic will also be met with resistance for reasons mentioned earlier.
11. The chamber assembly of Claim 3 further comprising a thermostat component for temperature control and regulation, with said the interior of the chamber assembly comprising of a thermal-insulated interior made with food grade high density polyethylene (HDPE) plastics of low thermal conductivity.
12. The chamber assembly of Claim 3 further consisting of a **thermoelectric system** for the cooling and heating requirements within the chamber internal ambience, controlled by the “head module” of claim 1a.
13. The thermoelectric system of Claim 12 further consisting of two **Peltier devices** each fitted with heat sinks, situated on either side of the chamber, that through the utilization of semiconductors and the application and the control of direct current (DC) flow allow for cooling and heating effects.
14. The Peltier devices of Claim 12. further acting as a dehumidifier by extracting water from the air as it passes through the cold front of a heat sink for which condensation is collected in a water tank and dry air recirculated back into the chamber.

15. The main receptacle of Claim 1a is designed to be used for the receiving, holding and dispatching {to authorized recipient(s) of parcels that may consist of food (that may be frozen, fresh, semi-processed, processed or cooked) and non-food items from a plurality of delivery couriers. Said receptacle further consists of the **communication module** of Claim 1b.
16. The door locking assembly of Claim 6, further controlled by a **security system** that is configured within the communication module of the “head module” so as to provide secured access to the various chamber assemblies of Claim 3. This is achieved through the control of the opening and closing; locking and unlocking of the windowed door of Claim 6. Said security system further configured to selectively allow authorized delivery couriers of from plurality of delivery couriers as well as authorized user(s) and/or recipient(s) to access the chamber assembly of said main receptacle.
17. The security system of Claim 16 further incorporating an authentication process through the means of a **software program** that is capable, when allowed, to retrieve, process and retain information about the delivering party, delivery location, parcel details and authorized recipient. Fundamentally, the software program matches key information in order to allow or reject access to the chamber in the receptacle of the device.
18. The software program of Claim 17 further matches information pertaining to the parcel and its delivering party to that of the correct receptacle and its authorized recipient. When a correct match occurs, the command is given by the “head module” to first unlock and open the chamber door and subsequently close and lock it after retrieval or delivery has been made. An error reading will result in no inaction on the part of the motorized chamber door but the pushing of alternative instructions and a notification to the relevant parties.
19. The chamber assembly of Claim 3 further consisting of an illumination system that utilizes a series of light emitting diodes (LED) for the aforementioned function of illuminating interior objects, drawing user attention as well as indicate the presence (or absence) of package(s) through various lighting colour and arrangements.
20. The chamber of Claim 3 further consisting of an in-chamber camera for the purpose of recording and reporting in-chamber footage and/or still photographs of parcels upon receipt and collection of said parcels.
21. The “head module” of Claim 1a, to be mounted on the main receptacle, comprising of a housing, display features, communication devices, a microprocessor embodying the **communication module** that is configured to capacitate machine autonomy with regards to the functions of the receptacle; said “head module” configured to facilitate machine to machine communication, machine to communication device(s) interaction, communication device(s) to machine interaction; human to machine, and machine to human interaction.
22. The “head module” of Claim 1a, to act as master controller for the command and control of the main receptacle, wherein said “head module” is also used for the control of other receptacles that are optionally attached via the **docking connector unit** of Claim 1c to the main receptacle which is in turn connected to the said head module via the same **docking connector unit**.
23. The docking connector unit of Claim 1c further consisting of ports and connectors for the purpose of interfacing with either the “head module”, the master unit, or other optional, slave receptacles.

24. The communication module of Claim 21 further comprising a **network module, authentication module, interactivity module, interfacing module and sensory module** for facilitate the function of the device of Claim 1.
25. The network module of Claim 24 further comprising of a software module for data link interface, network application and transport protocol.
26. The authentication model of Claim 24 further comprising of facial recognition, fingerprint recognition, **Bluetooth** module and **Near Frequency Communication (NFC)** software and hardware for the purpose of providing various methods for authenticating the plurality of user(s) and the delivery courier(s).
27. The interactivity module of Claim 24 further comprising of software and hardware meant for machine to machine communication via the Cloud server(s) routing various data to the relevant unit(s) of device(s).
28. The interfacing module of Claim 24 further comprising of software and hardware meant for human to machine communication, and vice versa, via the Cloud server and also through various screens, visual display(s) and speaker(s), microphone devices programmed to allow the “head module” to conduct auditory exchanges with human communicators.
29. The visual display(s) of Claim 28 further comprising a Liquid Crystal Display (LCD) colour touch screen; said visual display further comprising a panel display, said visual lighting(s);
30. The sensory module of Claim 24 further comprising of an electronic Passive Infrared (PIR) motion sensors located at various points external to the outer housing of Claim 3 for the main purpose of activating to “wake mode” the “head module” of Claim XX via Wake-on-LAN (WoL) protocol enabled within network module of Claim XX upon detection of a heat signature.
31. The PIR sensor of Claim 30 further consisting of pyroelectric elements that are activated when sensing a heat signature from a moving human object within a radius of five (5) meters.
32. The sensory module of Claim 24 further equipped with detection laser apparatus for the detection of object and/or obstacle and for limit sensing.
33. The sensory module of Claim 24 further equipped with in-chamber camera for capturing and recording visual data pertaining to chamber ambience.
34. A docking connector comprising of electrical connectors to allow communication between the “head module” of Claim 1a, and said machine to machine communication to main receptacle and secondary receptacles(s), and providing electrical supply for receptacle(s) in array arrangement.
35. Anchoring device of Claim 1d for the purpose of securing said package delivery unit to unmovable / fixed structure via an anchor point at the vicinity of the doorway / gateway.
36. Anchoring device of Claim 35 further comprising of a flexible, retractable, high-tension, high carbon stainless steel cable.

37. A “skin” for the purpose of aesthetic purposes of decorative accessorising; said “skin” is also for the purpose of practical customization and simple property identification.

38. Said “skin” and power ports for accessorizing purposes.

39. “Head module” of Claim 1a further consisting of a power source serves to charge an auxiliary battery unit that will power the microprocessor, maintain the operating system and provide power to accessories, lighting and displays of the device. Said power source will also directly power the thermoelectric system of Claim 12.

40. The method for receiving, securing, preserving and dispatching a parcel, the method comprising:

The storing of information regarding the parcel in the “cloud”, via the interactivity module of Claim 27 within the “head module” of Claim 1a.

The tracking of the parcel “delivery status” via the communication module of Claim 21 via communication with delivery party.

A program written to monitor the status of a receptacle “occupancy status” at any given time and upon the impending delivery of a parcel from an authorized delivery party, proceed to assign an unused receptacle to said delivery party. Said program also creates a log that records the various delivery processes of each delivery. Said program may or may not activate the thermoelectric devices of Claim 12 upon determination of the parcel type.

An authentication system that, upon successful authentication of deliverer or recipient, will authorize the opening of a receptacle’s door to receive the parcel and the closing of it and putting it in lock position upon a successful receipt of said package thus securing the parcel during its holding period.

A notification system programmed to relay parcel delivery and parcel condition status to the relevant parties upon the appropriated delivery touch points.

41. A mobile application will facilitate the interfacing module of Claim 28, allowing users to directly communicate to the device of Claim 1. Said mobile application is essentially a platform for the command and control of the device.