

LANDING PLATFORM WITH IMPROVED CHARGING FOR UNMANNED VEHICLES

The application relates to a landing platform and deployment system (which governs the launch, receiving/landing, alignment of the vehicle's charging contacts to the charging plate, charging of the energy storage medium, storing of the vehicle, etc. functions) for an unmanned vehicle (such as aerial multi-rotor, single-rotor, vertical takeoff landing vehicle that is also known as VTOL, hybrid-VTOL, fixed wing, vertically-launched vehicle, horizontally-launched vehicle, catapult-launched vehicle, hand-launched vehicle, or any other similar platform that is collectively known as "unmanned aerial vehicle" or "unmanned vehicle", or "drone") that has autonomous precision landing, automatic (or autonomous) alignment of the unmanned vehicle's charging mechanism for improved charging, and storing functionalities in addition to other relevant functions that are needed to safely deploy, control, and have all of the essential hardware for autonomous or human-piloted flight activities. The invention disclosed here is not limited to aerial vehicles, because other unmanned vehicles such as ground or underground robots, or underwater robots can also utilize the disclosed hardware and methods for deploying, charging, receiving, and storing purposes.

The recent years have seen a surge in the use of unmanned vehicles (air, ground, maritime, underground, underwater, etc.) for remote sensing, surveillance, and numerous other applications. The unmanned vehicle provides the advantage of being used in situations where manned flight is considered too risky or difficult. In order to increase the use of unmanned vehicles in the field, there is a critical need to improve their autonomous landing platform and deployment systems that have improved charging, landing, launch, storing, and all other functionalities integrated in a smart way to give to the

unmanned vehicles the capacity to deploy, receive, store, and recharge with energy when needed on its own. The content of this invention/method/hardware is not limited to the unmanned vehicles with autonomous nature; other human-piloted unmanned
5 vehicles can also benefit from the disclosed concepts and hardware.

It is an object of this application to provide an improved landing platform and deployment system with autonomous
10 precision landing and alignment of unmanned vehicle on the landing platform and improved charging mechanisms, having the landing platform's electrical contact made with unmanned vehicle's charging mechanism automatically (or autonomously), and also providing storage for an unmanned vehicle. While it
15 is highly desired to have such functions (deployment, landing, launching, charging, alignment for charging, charging, storing, etc.) carried out autonomously or automatically, the concepts disclosed here are also applicable to human-piloted (meaning non-autonomous) and other means controlled unmanned
20 vehicles as this invention discloses an improved energy autonomous nature for any unmanned vehicle platforms. In order to utilize unmanned vehicles at their full potential, there is a critical need for a landing platform and deployment system with automatic charging in order to improve the charging
25 process and potentially enable the landing platform and deployment system to carry out this process by their own. The content of this invention discloses novel strategies for improved charging mechanisms that are not only integrated into the airframe of the unmanned vehicle, but also integrated into
30 the landing platform that is smart and facilitates precision landing to the unmanned vehicle.

Currently deployed unmanned vehicles have not been utilized to their full potential due to lack of advanced landing platforms

that has smart functionalities such as autonomous precision landing, changing the orientation of the unmanned vehicle in order to match or mate the on-board charging contacts to the charging mechanism existing on the landing platform, and
5 automatically initiate and complete the charging process. Once the energy stored in the on-board energy storage and conversion devices of existing unmanned vehicles, the recharging of these vehicles usually requires the assistance of an operator and having operators in the field drastically
10 limits the usage of these unmanned vehicles.

The disclosed invention provides the details of an advanced landing platform and deployment system (and iterations of the baseline system) that has the following advanced functions
15 with full executability of the disclosed concepts: smart and precision landing for the unmanned vehicle, automatic (or autonomous) alignment of the unmanned vehicle in order to match the on-board charging contacts to the charging mechanism existing on the landing platform, self-initiating of the
20 charging process and self-termination of the charging process, storing of the vehicle, and numerous other features that are needed to autonomously deploy, control, and store it.

The unmanned vehicle can have an onboard computer for its
25 autonomous controlling its flight or can be piloted by a human pilot, who is on the ground or in another vehicle (whether moving or idle), can remotely control the flight of the unmanned vehicle with the help of a remote control mechanism, protocol, approach, or device. Furthermore, a virtual command
30 center application (either web-based or application-based) can also be utilized by the pilot or operator to manage various functions of the mission such as scheduling the flight, planning the unmanned vehicle flight path for area scanning or

detection, virtual teleoperation of the unmanned vehicle, and etc.

The application provides an improved self-aligning unmanned
5 vehicle landing system to charge the on-board electrical
energy storage and conversion device of the unmanned vehicle.
The landing system is also designed to facilitate landing of
the unmanned vehicle. The landing system comprises a polarity
switch, a first contact surface electrically connected to the
10 polarity switch, a second contact surface electrically
connected to the polarity switch, a power source electrically
connected to the polarity switch, a first longitudinal
adjustment beam, a first lateral adjustment beam, a motor, and
a transmission system connected to the motor, to the first
15 longitudinal adjustment beam and to the first lateral
adjustment beam to convert motor movement into linear movement
of the longitudinal adjustment beam and of the lateral
adjustment beam.

20 The system can be powered by an electric power supply grid, or
by batteries, which can be electrically charged using solar
cells, wind generators, stand-alone petrol, diesel, natural
gas, bio-mass fueled gen-sets, and/or fuel cells, or any other
relevant power source including the grid supply. The electric
25 power supply grid acts a channel to transmit electricity from
an electric power plant. The following power sources can also
be utilized by the system: internal combustion engines, solar
power, photovoltaic arrays, hydrothermal power, radioisotope
or radioactive power systems, nuclear fission based power
30 generators, thermal energy conversion devices, Stirling
convertors, Brayton converters, Rankine converters, micro-
miniature dynamic power converters that are integrated with
radioisotope heater units, alpha/beta-voltaic energy
conversion devices, bio-inspired power generation devices,

etc. The content of this invention is not limited to the type of power used and with the appropriate design considerations and use of the right materials/hardware, different power sources can easily be utilized to obtain a landing platform and deployment system with improved charging properties to not only charge the unmanned vehicle's depleted power source, but the same landing platform and deployment system can also be used for landing, receiving, storing and numerous other processes that are relevant to the operation and charging of the unmanned vehicle.

The unmanned vehicle comprises a positive electrode at one bottom end of the unmanned vehicle, and a negative electrode at an opposite bottom end of the unmanned vehicle. Typically, the electrodes are located at protruding parts of the unmanned vehicle, for example at its feet. If there are multiple legs for landing such as four, then care needs to be given that these electrodes are placed on the legs that are diagonal to each other in order to prevent the electrical shorting.

The adjustment beams are moved linearly towards a center of the landing pad and hereby push the unmanned vehicle into predetermined region that is allocated for landing. Since the unmanned vehicle has an essentially square layout (though the content of this invention is not limited to square layout, with simple adjustments in the design, other layouts can also benefit from this invention), for example because it has four feet positioned on four equidistant corners of the unmanned vehicle, the unmanned vehicle is brought into an aligned position by being pushed by one of the adjustment beams. By aligning the unmanned vehicle on the landing pad, the electrodes of the unmanned vehicle can make electric contact with the contact surfaces, thereby allowing for the unmanned vehicle to be charged, i.e. a power source of the unmanned

vehicle is charged. The said contact surfaces can be a part of the landing pad such as metal surfaces laminated to the surface of the landing pad, metal contacts placed or attached directly onto the surface of the landing pad, or metal
5 structures placed separately such as beams sliding over the landing pad, and other similar approaches that allows the unmanned vehicle's charging contacts to be in physical contact with another charging point that is existing on the landing platform and deployment system.

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The polarity switch is configured to electrically connect the first contact surface with the positive pole and the second contact surface in a first polarity state with the negative pole, or to electrically connect the first contact surface
15 with the negative pole and the second contact surface with the positive pole in a second polarity state. Hereto, the polarity switch detects which pole of the unmanned vehicle's power source is connected to the first contact surface and which pole is of the unmanned vehicle's power source is connected to
20 the second contact surface. The polarity switch can detect the polarity electrically, or detect a signal provided by the unmanned vehicle, for example a mechanic signal, a magnetic signal or an electronic signal, or any other communication method that will allow the landing platform and deployment
25 system to recognize the orientation of the charging contacts in order to match the polarity of the terminals appropriately.

The polarity switch may also comprise a third polarity state, wherein the contact surfaces and the battery poles are
30 electrically disconnected in order to prevent damage of the unmanned vehicle and the unmanned vehicle's power source.

Therein, the first contact surface is positioned away to the second contact surface, such that a typical electrode cannot

possibly short-circuit the first contact surface and the second contact surface. The distance of the first contact surface from the second contact surface must at least be larger than the widest expanse of any unmanned vehicle electrode in use. TO clarify this point further, for example if the unmanned vehicle has four legs, on-board charging contacts need to be placed on the legs that are farthest away from each other (in this case diagonally) in order to prevent the short-circuit.

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In one embodiment of the invention, the landing platform comprises a second longitudinal adjustment beam, wherein the second longitudinal adjustment beam is connected to the transmission system. The second longitudinal adjustment beam is connected to the transmission system so the motor movement can be converted to, amongst others, linear movement of the second longitudinal adjustment beam. The longitudinal adjustment beams, which are located opposite of each other, are moved towards each other. This way, the longitudinal adjustment beam cannot move the unmanned vehicle away from the center of the landing pad.

Alternatively, the landing platform comprises a second lateral adjustment beam, wherein the second lateral adjustment beam is connected to the transmission system. The second lateral adjustment beam is connected to the transmission system so the motor movement can be converted to, amongst others, linear movement of the second lateral adjustment beam. This way, the lateral adjustment beam cannot move the unmanned vehicle away from the center of the landing pad.

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In a preferable embodiment of the invention, the landing platform comprises a second longitudinal adjustment beam and a second lateral adjustment beam, wherein the second

longitudinal adjustment beam and the second lateral adjustment beam are connected to the transmission system. The second longitudinal adjustment beam and the second lateral adjustment beam are connected to the transmission system so the motor
5 movement can be converted to linear movement of the all four adjustment beams. This way, the unmanned vehicle is moved towards the center of the landing pad regardless of its initial position relative to the center of the landing pad.

10 In one embodiment, the longitudinal adjustment beams and/or the lateral adjustment beams are guided using guide rails. By using guide rails to guide the adjustment beams, the linear movement of the adjustment beams is more stable. Therefore, even in the case that the unmanned vehicle got stuck
15 somewhere, the adjustment beams would not lose their alignment and hence their function.

The application also provides an improved landing platform and deployment system with a cover. This landing platform and
20 deployment system include an unmanned vehicle, a self-aligning unmanned vehicle landing system, a unmanned vehicle protection storage device, and a cover. The landing platform and deployment system are also designed to facilitate landing of the unmanned vehicle, to gather data about the environment of
25 the unmanned vehicle using sensors, to serve as a data communications hub, and to protect the unmanned vehicle from the environment.

The self-aligning unmanned vehicle landing system is attached
30 to the unmanned vehicle and to the unmanned vehicle protection storage device for transferring electrical energy from the storage device to the unmanned vehicle. Electrical energy for charging the on-board energy storage and conversion device of the unmanned vehicle can also be provided from a fully

separated power source or a station that has its own power source such as a weather station that is a separate unit from the landing platform and deployment system and has its own power source.

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The unmanned vehicle protection storage device comprises a processing unit, a network unit, a power source, interfaces for extending its capability to accept power from multiple different sources, motors, switches, etc. needed to operate the landing platform and deployment system, and at least one sensor. Preferably, the unmanned vehicle protection storage device also houses the energy storage and conversion device and the polarity switch. The said one sensor can be at least be either one of an anemometer, a temperature sensor, a weather vane, or a camera, or any other relevant sensor depending on the overall design and mission requirement for the storage device. By measuring weather sensor data, the unmanned vehicle can be supported in flight, take-off, landing, and other relevant functions for the safe operation of the unmanned vehicle. The storage device power source can then electrically charge the electrical power source of the unmanned vehicle via the charging mechanisms existing within the landing platform and deployment system and on-board of the unmanned vehicle. In other words, the storage unit power source provides electrical energy to an electrical power source of the unmanned vehicle.

The network unit can comprise any network technology usable for transmitting and receiving data, for example GSM, UMTS, LTE, WLAN, 5G, directional radio, satellite radio, DSL, or fiberglass (and the content of this invention is not limited to the examples provided herein for explanation purposes). The network unit can also comprise a number of such technologies and manage their use as needed.

The unmanned vehicle can have full autonomous nature for its flight or be controlled remotely by a user (also known as human-piloted). Alternatively, the unmanned vehicle can be
5 guided by a computer, which is provided as an onboard computer and attached to the main body of the unmanned vehicle. Or alternatively, the unmanned vehicle can be directed remotely by a processing unit, which is provided as a standalone computer inside the unmanned vehicle protection storage
10 device. Preferably, a combination of those alternatives is employed, such that the unmanned vehicle can maintain a stable position and fulfil simple tasks autonomously, can be remote-controlled by the processing unit provided in the unmanned vehicle protection storage device when sensor data available
15 to the unmanned vehicle protection storage is helpful, and can be remote-controlled by a person on demand (depending on the mission needs and unmanned vehicle needs).

In one embodiment, the at least one sensor of the unmanned
20 vehicle protection storage device comprises a camera. The unmanned vehicle further comprises a beacon unit for emitting light to form a light pattern that can be captured by the camera. The processing unit of the unmanned vehicle protection storage device is configured to direct the unmanned vehicle to
25 land remotely based on image data from the camera, which comprises light imagery of the beacon unit. In this case, remote control by the processing unit is, for example, useful in the landing process. Then the processing unit can recognize, for example using pattern recognition such as a QR
30 code, barcode, etc. (though the content of this invention is not limited to these examples), light emitted by the beacon unit on the image data provided by a camera on the unmanned vehicle protection storage in order to smartly manage the landing of the unmanned vehicle or provide means for precision

landing by using its sensor. In summary, having a moveable landing platform and a landing code attached to the predetermined landing region such as a QR code will allow the unmanned vehicle to visually notice the pattern recognition
5 using its on-board sensing device such a camera for the vision system and hence land precisely directly onto the predetermined landing region.

In one embodiment, the power source comprises a solar power
10 system. A solar power system can for example be a solar panel, also known as photovoltaic panel, a battery and a current converter. Alternatively, a solar power system can be based on a solar pond, a parabolic collector and/or a solar power tower. By using a solar power system, the unmanned vehicle
15 landing platform and deployment system become more autonomous, hence a unmanned vehicle landing platform and deployment system in a remote location can be maintained without physical contact for a longer time period than using other power sources. The solar power is provided as an example and the
20 content of this invention is not limited to this example for is operation. There exist several other power schemes and hardware which can be utilized for the powering of the landing platform and deployment system and all of the other associated hardware disclosed within this invention.

25 A short list of different power sources that can be utilized by landing platform and deployment system, unmanned vehicle, weather station and all other relevant modules that are needed to operate the unmanned vehicle as follows: batteries,
30 hydrogen fuel cell cells, internal combustion engines, solar power, photovoltaic arrays, wind power, hydrothermal power, radioisotope or radioactive power systems, nuclear fission based power generators, thermal energy conversion devices, Stirling convertors, Brayton converters, Rankine converters,

micro-miniature dynamic power converters that are integrated with radioisotope heater units, alpha/beta-voltaic energy conversion devices, bio-inspired power generation devices, etc. The content of this invention is not limited to the type of power used and with the appropriate design considerations and use of the right materials/hardware, different power sources can easily be utilized to obtain a landing platform and deployment system with improved charging properties to not only charge the unmanned vehicle's depleted power source, but the same landing platform and deployment system can also be used for landing, receiving, storing and numerous other processes that are relevant to the operation and charging of the unmanned vehicle.

15 The unmanned vehicle includes one or more propellers and an air vehicle electrical power source. The air vehicle electrical power source provides electrical energy to the propellers. The energized propellers then move the unmanned vehicle laterally and/or longitudinally.

20 The unmanned vehicle is often provided with one or more rotary wings, although it can also be provided with one or more fixed wings or with one or more hybrid wings. The hybrid wings comprise both rotary and fixed wings. The content of this invention also covers the following unmanned vehicles: aerial multi-rotor, single-rotor, vertical takeoff landing vehicle that is also known as VTOL, hybrid-VTOL, fixed wing, vertically-launched vehicle, horizontally-launched vehicle, catapult-launched vehicle, hand-launched vehicle, or any other similar platform that is collectively known as "unmanned aerial vehicle" or "unmanned vehicle", or "drone".

30 Furthermore, the content of this invention can also be implemented for the other following unmanned vehicles: ground or underground robots, or underwater robots.

The unmanned vehicle landing platform and deployment system can include a movable cover, which can be opened for allowing the unmanned vehicle to ingress into the container and to egress from the container and be closed for protecting the unmanned vehicle. The movable cover can be adapted for rotating about a hinge in order to facilitate the cleaning of the cover for snow, sand, rain, or dust could collect over the cover and may hamper its operation. The movable cover allows these contaminations to be removed when the cover opens. The cover can also have other cleaning mechanisms such as moving or static brush with bristles, liquid cleaning solvent such as water, liquid cleaning solvent such as water with a wiping device, etc. in order to clean the contaminants from the cover. The cleaning process can be done automatically or it can also be serviced by a human operator.

In an alternative embodiment, the movable cover is provided in the form of a sliding door for easy implementation.

In one embodiment, the unmanned vehicle landing platform and deployment system further comprises a cover, and the transmission system is further connected to the cover for converting motor movement into movement for opening and closing the cover. When the unmanned vehicle is not in use, it can be placed under a cover for protecting the unmanned vehicle against the surrounding weather and against animals or unauthorized persons from accessing the unmanned vehicle. In an open state, the cover can facilitate the landing of the unmanned vehicle by shielding the unmanned vehicle against wind. By moving the cover using the motor already used for the movement of the adjustment beams, the unmanned vehicle landing platform and deployment system can be more reliable, cheaper, and more compact.

The alignment mechanism existing on the landing platform and deployment system can include at least a group of plurality of plates or beams or doors for pushing the unmanned vehicle to the landing area, at least two fixed inclined walls for guiding the unmanned vehicle to the landing area and at least two moveable inclined walls for guiding the unmanned vehicle to the pre-determined landing region. These two moveable inclined walls can be represented by the moveable cover from the landing platform and deployment system (which is also called Dronebox module's opening/closing doors or moveable cover). These alignment structures provide different means of auto- or self-aligning of the unmanned vehicle. The Dronebox provides a smart unmanned vehicle nesting (or smart drone nesting) solution that automates the unmanned vehicle operations in numerous applications. The power solution or power module of the Dronebox also provides a grid-independent charging system for the unmanned vehicle's power device that eventually eliminates the need for an operator to travel to the field or remote areas for charging of the on-board power device.

The unmanned vehicle storage device can also include communication and coordination unit for communicating with storage units of other unmanned vehicle modules and with other unmanned vehicles. The processing unit can comprise storage for storing data and programs, and interfaces for exchanging data and commands.

For example, the processing unit can be ground based (meaning stored inside the storing module or weather station, or any other ground based module) and can comprise means for controlling the unmanned vehicle, such as communications means, simulation means, a flight model, and a reaction model.

- Since the processing unit is on the ground, it is less restricted by space, weight, cooling, and energy restrictions. Therefore, the processing unit can have significantly more resources than the unmanned vehicle, for example energy, sensor data, and processing capabilities. Such a ground based processing unit provides several advantages. The processing unit uses wind speed and wind direction data to prepare unmanned vehicle flight instructions depending on the weather estimates and/or hyper-local data estimates, which is important, especially in weather conditions that may not be suitable for the safe operation of the unmanned vehicle prior to mission, during the mission, or after the completion of the mission.
- Alternatively or additionally, the unmanned vehicle can make more abstract instructions to the unmanned vehicle, which the unmanned vehicle can execute using an on-board computer. The computer can collect the IMU data given by the flight controller (whether this is command coming from the on-board computer or human pilot). For the autonomous case, this has the advantage of improved latency and less range dependency compared to an above-discussed remote control of the unmanned vehicle by the processing unit.
- The processing unit allows reduction of unmanned vehicle payload, since the unmanned vehicle does not need to carry a camera for detecting the landing platform. Instead, the landing platform has a camera for detecting the unmanned vehicle, in order to provide flight instructions for the unmanned vehicle to land on the landing platform.

In another embodiment, the said sensor such as a camera located on the landing platform and deployment system or weather station, or any module that is on the ground can be

utilized for the following function: camera sensing device can be used to have the capability of beyond-the-line-of-sight or virtual-line-of-sight (using its local camera pole) in order to safely operate the unmanned vehicle or meet the

5 requirements of local regulations without having a pilot or operator in the vicinity of the unmanned vehicle by using a software or some other controls on the cameras installed on the storing/refueling station, in which the cameras visual observation capability is utilized fully to track the flight

10 of the unmanned vehicle. This virtual-line-of-sight functionality can also be introduced to the computers located on-board or on the ground modules to further increase the autonomous nature of the unmanned vehicle for safety and other local regulation reasons.

15

The subject matter of the application is described in greater detail in the accompanying figures, in which

- Fig. 1 illustrates a schematic top view of an unmanned vehicle charging system,
- 20 Fig. 2 illustrates a schematic top view of an alternative unmanned vehicle charging system,
- Fig. 3 illustrates a schematic top view of a self-aligning unmanned vehicle landing system
- 25 comprising the unmanned vehicle charging system of Fig. 1 in an unaligned state,
- Fig. 4 illustrates a schematic top view of the self-aligning unmanned vehicle landing system of Fig. 3 in an aligned state,
- 30 Fig. 5 illustrates a schematic aerial view of an unmanned vehicle landing platform and deployment system comprising the self-adjusting unmanned vehicle landing system of Fig. 3,

- Fig. 6 illustrates a schematic aerial view of an unmanned vehicle landing platform and deployment system of Fig. 5 further comprising a cover that is placed in an open state,
- 5 Fig. 7 illustrates a schematic aerial view of the unmanned vehicle deployment system of Fig. 6, wherein the cover is placed in a closed state,
- Fig. 8 illustrates a schematic view of another implementation of the cover of the unmanned vehicle deployment system of Fig. 6 where the
10 cover slides over the landing platform and deployment system via guiding rails,
- Fig. 9 illustrates a schematic aerial view of an unmanned vehicle deployment system of Fig. 6, wherein the
15 unmanned vehicle landing platform and deployment system comprises an unmanned vehicle storage box with multiple unmanned vehicle capability,
- Fig. 10 illustrates a schematic side view of the unmanned vehicle storage box of the unmanned vehicle
20 deployment system of Fig. 9. where one of the unmanned vehicles is being deployed,
- Fig. 11 illustrates a schematic view of unmanned vehicle storage box with moveable landing platform and
25 deployment system and an unmanned vehicle with charging contacts integrated to the landing gear,
- Fig. 12 illustrates a schematic view of an alternative unmanned vehicle storage box with moveable landing
30 platform and deployment system that has a separate module containing the weather station, communication/control module, power module and switchable rectifier sub-systems and an unmanned vehicle with charging contacts integrated to the landing gear,

- Fig. 13 illustrates a schematic view of an unmanned vehicle storage box of Fig. 12 with a QR code marked landing region to improve the precision landing process,
- 5 Fig. 14 illustrates a schematic view of an unmanned vehicle storage box of Fig. 13 with the landing platform having a recessed landing region to keep the unmanned vehicle within the predetermined landing region after its landing and alignment of
10 its orientation and an unmanned vehicle with rolling elements integrated into the landing gear and a fence to deter animals or humans for breaching the safety of the unmanned vehicle storage box (it is also called Dronebox),
- 15 Fig. 15 illustrates a schematic view of an unmanned vehicle storage box of Fig. 14 with the landing platform having a recessed landing region to keep the unmanned vehicle within the predetermined landing region after its landing and alignment of
20 its orientation and an unmanned vehicle with rolling elements integrated into the landing gear,
- Fig. 16 illustrates a schematic view of an alternative unmanned vehicle storage box of Fig. 15 with a different charging mechanism on the landing
25 platform and weather station having the capability of storing multiple different power solutions or receiving electrical energy from multiple different power schemes,
- Fig. 17 illustrates a schematic view of an alternative
30 unmanned vehicle storage box of Fig. 16 with solar cells or photovoltaic cells integrated to the unmanned vehicle storage box to further improve the energy autonomous nature of the unmanned vehicle and storage box, and

- Fig. 18 illustrates a schematic view of an unmanned vehicle of Fig. 14 with its rolling elements integrated into the landing gears, its charging contacts integrated into the landing gear and its charging wires connected between its on-board power storage and conversion device and its on-board charging contacts,
- Fig. 19 illustrates a schematic view of an unmanned vehicle and its landing platform and deployment system that is provided in Fig. 18 with their standalone processing units,
- Fig. 20 illustrates an alternative embodiment of the unmanned vehicle and its landing platform and deployment system that is provided in Fig. 19 and with its exterior look to be designed to have a camouflaged texture for defense applications using the appropriate color/texture/markings such as green colored exterior or camo textured colored exterior, etc.,
- Fig. 21 illustrates an alternative embodiment of the unmanned vehicle and its landing platform and deployment system that is provided in Fig. 19 and with its exterior look to be designed to have the theme of a smart city concept using the appropriate color/texture/markings such as white-to-gray background color with gray text color and blue partial-text coloring for Singapore, etc.,
- Fig. 22 illustrates an alternative embodiment of the unmanned vehicle and its landing platform and deployment system that is provided in Fig. 19 and with its exterior look to be designed to have the theme relevant to a construction-site concept using the appropriate color/texture/markings such

as orange or yellow background color with properly angled black and orange or yellow stripes, etc.,

Fig. 23 illustrates an alternative embodiment of the unmanned vehicle and its landing platform and deployment system that is provided in Fig. 19 and with its exterior look to be designed to have the theme relevant to a certain locality using the appropriate color/texture/markings such as having sand colored exterior for desert areas such as a locality in Africa or forestry colored exterior for particular city in the vicinity of jungles, etc.,

In the following description, details are provided to describe embodiments of the application. It shall be apparent to one skilled in the art, however, that the embodiments may be practiced without such details.

The embodiments have similar parts. The similar parts may have same names or similar part numbers. The description of one part applies by reference to another similar part, where appropriate, thereby reducing repetition of text without limiting the disclosure.

Fig. 1 shows a schematic view of an unmanned aerial vehicle (unmanned vehicle) charging system 1. The unmanned vehicle charging system 1 includes a landing pad 100, a power module or a battery 122, and a polarity switch 121. The polarity switch 121 is electrically connected to the a power module or a battery 122 and to the landing pad 100.

The landing pad 100 comprises a first contact surface 111 and a second contact surface 112. These contact surfaces 111 and 112 are electrically connected to the polarity switch 121. The

contact surfaces 111 and 112 are rectangular surfaces made of essentially non-magnetic electrically conductive material, such as aluminum, copper, stainless steel, and other various metal or alloys that has sufficient electrical conductivity and acceptable corrosion resilience properties.

The rectangular contact surfaces 111 and 112 are positioned centrally on the landing pad 100 such that the contact surfaces 111 and 112 are parallel to each other and are spaced from a center of the landing pad 100 by a predetermined distance. The predetermined distance is selected such that an electrode of a landed unmanned vehicle does not cause a short-circuit between the first contact surface 111 and the second contact surface 112.

In one implementation, the rectangular contact surfaces 111 and 112 have a size of 300 millimeter (mm) by 100 mm. They are placed on the landing pad 100 such that they are parallel to each other and are separated from the center of the landing pad by 48 mm. In other words, the contact surfaces 111 and 112 are separated from each other by 96mm. These length or distance figures are only provided for explaining the current matter in more detail and the coverage of this invention is not limited to the provided length or dimensions that are provided in the abovementioned section.

The other portions of the landing pad 100 are made of non-conductive and non-magnetic material.

The a power module or a battery 122 has a positive pole 123 and a negative pole 124. The positive pole 123 and the negative pole 124 are electrically connected to the polarity switch 121. The pole is also called a terminal.

In use, the polarity switch 121 is used for electrically connecting the positive pole 123 and the negative pole 124 to the contact surfaces 111 and 112. In detail, the polarity switch 121 can be configured to operate in a first polarity state, a second polarity state, and a third first polarity state. In the first polarity state, the polarity switch 121 is configured to electrically connect the first contact surface 111 with the positive pole 123 and to electrically connect the second contact surface 112 with the negative pole 124. In the second polarity state, the polarity switch 121 is configured to electrically connect the first contact surface 111 with the negative pole 124 and to electrically connect the second contact surface 112 with the positive pole 123. In the third polarity state, the polarity switch 121 is configured to electrically disconnect the contact surfaces 111 and 112 from the energy storage and conversion device or battery poles 123 and 124.

The landing pad 100 is intended for receiving a landing unmanned vehicle 101, which includes a positive electrode 102 and a negative electrode 103. These electrodes 102 and 103 are electrically connected to an electrical energy device, such as a rechargeable battery or the energy storage and conversion device, of the unmanned vehicle 101. The electrodes 102 and 103 are often located at protruding parts of the unmanned vehicle 101, for example, at its feet. For an unmanned vehicle 101 having an essentially square layout, the unmanned vehicle 101 often has four feet positioned on four equidistant bottom corners of the unmanned vehicle 101. The positive electrode 102 is located at one of its feet near a first bottom corner of the unmanned vehicle 101 and the negative electrode 103 is located at another foot that is near a second bottom corner, which is diagonally opposite to the first bottom corner of the unmanned vehicle 101.

When an unmanned vehicle 101 lands on the landing pad 100, its positive electrode 102 may contact the first contact surface 111 while, at the same time, its negative electrode 103 may
5 contact the second contact surface 112. The polarity switch 121 is then placed in the first polarity state. This allows the positive electrode 102 of the unmanned vehicle 101 to be electrically connected to the positive pole 123 of the battery or power module 122 via the first contact surface 111
10 and allows the negative electrode 103 of the unmanned vehicle 101 to be electrically connected to the negative pole 124 of the battery or power module 122 via the second contact surface 112, thereby allowing the power module or battery 122 to electrically charge the battery (or electrical
15 energy storage and conversion device) of the unmanned vehicle 101.

Alternately, the negative electrode 103 may contact the first contact surface 111 while, at the same time, the positive
20 electrode 102 may contact the second contact surface 112. The polarity switch 121 is then placed in the second polarity state. This allows the negative electrode 103 of the unmanned vehicle 101 to be electrically connected to the negative pole 124 of the battery or power module 122 via the first
25 contact surface 111 and allows the positive electrode 102 of the unmanned vehicle 101 to be electrically connected to the positive pole 123 of the battery or power module 122 via the second contact surface 112, thereby allowing the battery or power module 122 to charge the battery (or an electrical
30 energy storage and conversion device) of the unmanned vehicle 101. The contact surface 111 or 112 is also called a charging contact or a charging plate or a charging element.

The polarity switch 121 can be placed in a selected polarity state automatically using a voltage sensor. The voltage sensor acts to determine or measure a voltage potential between the positive electrode 102 and the negative electrode 103. The polarity of the measured voltage is then used to select a polarity state of the polarity switch 121 accordingly. The polarity state can also be selected using a position sensor, such as a magnetic position sensor, a mechanic position sensor, an optical position sensor, or a capacitive position sensor. The position sensor can also be any sensor that can distinguish variants of two positions.

The contact surfaces 111 and 112 can be implemented in different manner.

In one implementation, as shown in Fig. 2, both the contact surfaces 111 and 112 have a shape of a semi-disk. The contact surfaces 111 and 112 are positioned centrally on the landing pad 100 such that the two contact surfaces 111 and 112 in the semi-disk shape are spaced apart from each other by a predetermined distance to form a shape of a disk with an elongated gap passing through its center from one part of a circumference edge to another part of the circumference edge.

The contact surfaces 111 and 112 can also have other shapes and can be placed at different positions on the landing pad 100. Each contact surface preferably covers at least a substantial portion of two corners of a rectangle that is sized to match a size of a bottom of an unmanned vehicle 101. For example, an unmanned vehicle 101 can have a bottom with a square shape having each side with a length of 2 meters (m) and each contact surface can be a half-circle with a diameter of 2.4m. These length or distance figures are only provided for explaining the current matter in more detail and the

coverage of this invention is not limited to the provided length or dimensions that are provided in the abovementioned section.

- 5 Fig. 3 shows a schematic view of a self-adjusting (also known as self-aligning) unmanned vehicle landing platform and deployment system 2. The unmanned vehicle landing platform and deployment system 2 comprises a power module or a battery 122, a polarity switch 121, and an improved landing platform 90.
- 10 The polarity switch 121 is electrically connected to the power module or battery 122 and to the improved landing platform 90. An arrangement of the power module or battery 122 and the polarity switch 121 of the unmanned vehicle landing system 2 and the arrangement of the power module or battery 122 and the
- 15 polarity switch 121 of the unmanned vehicle charging system 1 are similar.

The improved landing platform 90 includes a landing pad 100 and an unmanned vehicle positional alignment unit 198 which is

20 comprised of multiple adjustment beams such as first longitudinal adjustment beam 201, second longitudinal adjustment beam 202, first lateral adjustment beam 211, and second lateral adjustment beam 212 which is provided on the landing pad 100.

25

The landing pad 100 includes a first contact surface 111 and a second contact surface 112. These contact surfaces 111 and 112 are electrically connected to the polarity switch 121. The contact surfaces 111 and 112 are placed on opposing sides of a

30 center of the landing pad 100.

The unmanned vehicle positional alignment unit 198 not only includes a first longitudinal adjustment beam 201, a second longitudinal adjustment beam 202, a first lateral adjustment

beam 211, a second lateral adjustment beam 212, but also a motor 221, position or limit switches, guiding rails, etc. in order to move the adjustment beams properly and safely to the desired destinations during the alignment process of the
5 unmanned vehicle. The first longitudinal adjustment beam 201, the second longitudinal adjustment beam 202, the first lateral adjustment beam 211, and the second lateral adjustment beam 212 are connected to the motor 221 by a transmission mechanism, which is not shown in the figure. Examples of the
10 transmission mechanism include a gear drive, a belt drive, and a linear actuator just to name a few and the disclosed invention is not limited to these examples.

The first longitudinal adjustment beam 201 and the second
15 longitudinal adjustment beam 202 are positioned atop the landing pad 100 along two opposing edges of the landing pad 100 such that these longitudinal adjustment beams 201 and 202 are substantially parallel to each other and facing each other. They are respectively spaced from the center of the
20 landing pad 100 by a substantially same predetermined distance such that they are substantially parallel to the rectangular contact surfaces 111 and 112. The longitudinal adjustment beams 201 and 202 are movable in lateral directions 203 that are essentially perpendicular to the longitudinal adjustment
25 beams 201 and 202.

The first lateral adjustment beam 211 and the second lateral adjustment beam 212 are positioned atop the landing pad 100 along the other two opposing edges of the landing pad 100 such
30 that these lateral adjustment beams 211 and 212 are substantially parallel to each other and facing each other. They are respectively spaced from the center of the landing pad 100 by a substantially same predetermined distance such that they are substantially perpendicular to the longitudinal

adjustment beams 201 and 202. The lateral adjustment beams 211 and 212 are movable in longitudinal directions 213 that are essentially perpendicular to the lateral directions 203 or to the lateral adjustment beams 211 and 212.

5

The motor 221 with the transmission mechanism is positioned near an edge of the landing pad 100 so that the motor 221 with the transmission mechanism is far from the center of the landing pad 100. The motor 221 can be, for example, a DC motor or a stepper motor.

10

In use, the unmanned vehicle landing platform and deployment system 2 provides an unadjusted (also known as unaligned) state and an adjusted (also known as aligned) state.

15

In the unadjusted state, the first longitudinal adjustment beam 201 and the second longitudinal adjustment beam 202 are separated from each other by a first maximum distance while the first lateral adjustment beam 211 and the second lateral adjustment beam 212 are separated from each other by a second maximum distance. A landing area that is bounded by the adjustment beams 201, 202, 211, and 212 is also the maximum. In one implementation as an example, the maximum landing area is 2 meter (m) by 2m. Depending on the size of the unmanned vehicle, this maximum landing area is defined by the size of unmanned vehicle used for the desired mission and it can be adjusted to the required length. The polarity switch 121 is also placed in a third polarity state, wherein none of the contact surfaces 111 and 112 is connected to the electric poles 123 and 124 of a power module or a battery 122.

20

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The landing area is intended for receiving a landing unmanned vehicle 101. Depending on an initial landing position and alignment or orientation of the unmanned vehicle 101,

different unmanned vehicle landing scenarios are possible. In a first unmanned vehicle landing scenario, one of the electrodes 102 and 103 initially contacts either the first contact surface 111 or the second contact surface 112 of the landing pad 100. In a second unmanned vehicle landing scenario, the positive electrode 102 and the negative electrode 103 initially contact the respective contact surfaces 111 and 112. In a third unmanned vehicle landing scenario, neither the positive electrode 102 nor the negative electrode 103 initially contacts any of the contact surfaces 111 or 112, as illustrated in Fig. 3.

When an unmanned vehicle 101 lands on a position of the landing area, the motor 221 is activated to drive the respective adjustment beams 201, 202, 211, and 212 to move towards the center of the landing pad 100. The longitudinal adjustment beams 201 and 202 move in opposing lateral directions 203 towards the center of the landing pad 100 while the lateral adjustment beams 211 and 212 move in opposing longitudinal directions 213 towards the center of the landing pad 100.

One of the moving longitudinal adjustment beams 201 and 202 later touches a part of the unmanned vehicle 101 and pushes the unmanned vehicle 101 towards the center of the landing pad in the lateral direction 203. Similarly, one of the moving lateral adjustment beams 211 and 212 then also touches a part of the unmanned vehicle 101 and pushes the unmanned vehicle 101 towards the center of the landing pad in the longitudinal direction 213. The moving adjustment beams 201, 202, 211, and 212 finally push the UAC 101 to the center of the landing pad 100, where the landing area bounded by the adjustment beams 201, 202, 211, and 212 is reduced to about the size of a bottom of the unmanned vehicle 101.

Within this landing area, the positive electrode 102 and the negative electrode 103 of the unmanned vehicle 101 contact the respective contact surfaces 111 and 112, as shown in Fig. 4.

5 Depending on the initial landing position and orientation of the unmanned vehicle 101, there are two possible situations for the electrodes 102 and 103 to contact with the contact surfaces 111 and 112.

10 In a first situation, the positive electrode 102 contacts the first contact surface 111 while the negative electrode 103 contacts the second contact surface 112. The polarity switch 121 is then placed in the first polarity state, wherein the polarity switch 121 electrically connects the positive
15 electrode 102 to the positive pole 123 of a power module or a battery 122 and electrically connects the negative electrode 103 to the negative pole 124 of a power module or a battery 122. This electrical connection allows the a power module or a battery 122 to charge the energy storage and
20 conversion device or battery of the unmanned vehicle 101.

In a second situation, the positive electrode 102 contacts the second contact surface 112 while the negative electrode 103 contacts the first contact surface 111. The polarity switch
25 121 is later placed in the second polarity state, wherein the polarity switch 121 electrically connects the positive electrode 102 to the positive pole 123 and electrically connects the negative electrode 103 to the negative pole 124. This electrical connection allows a power module or a battery
30 122 to charge the energy storage and conversion device or battery of the unmanned vehicle 101.

Once the electrical connection between the energy storage and conversion device or battery of the unmanned vehicle 101 and a

power module or a battery 122 is established (as seen in Fig. 4), the motor 221 stops moving the adjustment beams 201, 202, 211, and 212, thereby preventing the moving adjustment beams 201, 202, 211, and 212 from pressing further against the
5 unmanned vehicle 101 and avoiding a damage to the unmanned vehicle 101. In this state, the unmanned vehicle landing platform and deployment system 2 is placed in the adjusted state. In this adjusted state, the motor 221 is far from the center of the landing pad 100, where the landed unmanned
10 vehicle 101 is positioned. Influence of magnetic interference from the motor 221 on the electronic equipment of the unmanned vehicle 101 is greatly reduced or minimized.

In one implementation, the unmanned vehicle landing platform
15 and deployment system 2 further include guide rails to guide the linear movement of the adjustment beams 201, 202, 211, and 212, thereby providing stability for the movement of the adjustment beams 201, 202, 211, and 212.

20 Fig. 5 shows a schematic aerial view of an unmanned vehicle landing platform and deployment system 3. The unmanned vehicle landing platform and deployment system 3 comprises a unmanned vehicle landing platform and deployment system 2 that is described above, an unmanned vehicle 101, and an unmanned
25 vehicle's integrated weather station and power module 31. The unmanned vehicle's integrated weather station and power module 31 is electrically connected to the unmanned vehicle landing platform and deployment system 2 and is communicatively connected to the unmanned vehicle 101.

30

The unmanned vehicle 101 comprises an unmanned vehicle battery (or an energy storage and conversion device), a positive electrode 102 on-board of the unmanned vehicle 101, a negative electrode 103 on-board of the unmanned vehicle unit 101, and a

beacon unit 104. The positive electrode 102 and the negative electrode 103 are electrically connected to the unmanned vehicle battery's respective terminals (meaning positive electrode 102 is connected to the positive terminal of the on-board powering device such as battery and negative electrode 103 is connected to the negative terminal of the on-board powering device such as battery), which is electrically connected to the beacon unit 104.

10 The beacon unit 104 includes an infrared (IR) light source with visible light sources and a cover plate. The infrared light source, the visible light sources, and the cover plate are mounted on a top surface of the unmanned vehicle 101. The cover plate includes a plurality of openings and it is placed
15 above the infrared light source and the visible light sources.

The unmanned vehicle's integrated weather station and power module 31 comprises a processing unit 128 that is provided in an enclosure box 321, and a post carrying a sensor array. The enclosure box 321 also encloses a polarity switch 121 and a battery or a power module 122 of the unmanned vehicle landing platform and deployment system 2. The processing unit 128 is electrically connected to the polarity switch 121, to the battery or power module 122, and to the sensor array, which is
20 also electrically connected to the battery or power module 122.

The sensor array includes an anemometer 311, a temperature sensor 312, a weather vane 313, a camera 314, and a network unit 315. The anemometer 311, the temperature sensor 312, the weather vane 313, the camera 314, and the network unit 315 are electrically connected to the processing unit 128. The network unit 315 includes a modem module and an antenna.

In use, the infrared (IR) light source of the beacon unit 104 of the unmanned vehicle 101 acts to emit infrared light rays, which pass through the openings of the cover plate to form an infrared light ray pattern.

5

The visible light sources of the beacon unit 104 serves to emit visible light rays, which pass through the openings of the cover plate to form a visible light ray pattern.

10 The infrared light and the visible light are used in different weather conditions. In an event of rainy weathers, water droplets and moisture present in the rain can block the infrared light rays and cause difficulty in detecting the infrared light rays. The visible light rays are used for
15 detecting the position of the unmanned vehicle 101. In an event of strong sunshine, the sunshine can cause difficulty in detection of the visible light ray pattern, the infrared light rays are used for detecting the position of the unmanned vehicle 101.

20

The camera 314 comprises an infrared light ray image sensor and a visible light ray image sensor. The infrared light ray image sensor is intended for capturing images of the infrared light ray pattern and sending the captured image data to the
25 processing unit 128. The visible light ray image sensor is used for capturing images of the visible light ray pattern and sending the captured image data to the processing unit 128.

The processing unit 128 then processes the captured image data
30 to generate flight instructions or commands for transmitting to the modem module of the network unit 315. The modem module later converts the received flight commands from the processing unit 128 to radio signals for transmitting to the antenna of the network unit 315. The antenna then transmits

the radio signals to the unmanned vehicle 101 for guiding the unmanned vehicle 101 to the landing platform. The antenna can also receive radio signals from the unmanned vehicle 101. The modem module then converts the received radio signals from the
5 antenna to digital data for transmitting to the processing unit 128.

The network unit 315 can further be configured to receive radio signals from other sources, such as Global Positioning
10 System (GPS) and/or Global Navigation Satellite System (GNSS) or any other position indicating sources.

In a further embodiment, the unmanned vehicle landing platform and deployment system 3 include a laser device (not shown
15 here) for emitting light rays. The laser light rays are emitted coherently, and they can be easily focused. The wavelength of the laser light rays can be adapted or selected such the laser light rays penetrate certain objects, such as haze or rain.

20 Referring to the sensor array, the anemometer 311, which is also called a wind gauge or a wind speed sensor, is intended for measuring speed of wind and for sending the measured speed of the wind to the processing unit 128. The weather vane 313,
25 which is also called a wind direction sensor, acts to detect direction of the wind and to send the detected wind direction to the processing unit 128. The temperature sensor 312 is used for measuring environmental temperature around the unmanned vehicle deployment system 3 and for sending the measurements
30 of the environmental temperature to the processing unit 128.

The sensor array can further include weather sensors (including a hyper-local weather forecasting sensors) and ambient light sensors. The weather sensors act to detect the

presence of weather in the vicinity of the unmanned vehicle or its mission radius, have the capability of forecasting the local weather from 0-10, 10-20, 20-50, 50-100, 100-500, and 500-1000, and 1000-10000 meter altitude, detect rain, hail, or snow falling on the sensor itself by measuring the ambient precipitation and temperature of the precipitation, and all of the other relevant weather phenomenon that is needed for the safe operation of the unmanned vehicle. The ambient light sensors serve to measure the ambient light intensity. The respective sensor data provided by all of these sensors are also sent to the processing unit 128.

The processing unit 128 is adapted to aggregate the sensor data for detecting or determining the presence of rain, hail, snow, storm, etc. and other weather phenomena as well as conditions of rainfall or snowfall. This allows the processing unit 128 to autonomously manage the decision-making process in regard to determining whether the unmanned vehicle 101 may be permitted to take-off or land under varying degrees of severity of rainy or snowy or some other abnormal environmental or weather conditions.

The processing unit 128 can generate flight commands in response to this decision-making process and transmit, via the network unit 315, the generated flight commands to the unmanned vehicle 101. For example, the processing unit 128 can generate and transmit a command to the unmanned vehicle 101 for instructing the unmanned vehicle 101 to initiate landing in reaction to detecting upcoming heavy rainfall. In another example, the processing unit 128 can transmit another command to the unmanned vehicle 101 for instructing the unmanned vehicle 101 to postpone landing, or even to leave the area, in reaction to a detection of strong wind.

Figs. 6 and 7 show a schematic aerial view of an unmanned vehicle landing platform and deployment system 3a, which is a variant of the unmanned vehicle landing platform and deployment system 3.

5

The unmanned vehicle landing platform and deployment system 3a includes parts that correspond to the parts of the unmanned vehicle landing platform and deployment system 3. An arrangement of the parts of the unmanned vehicle landing
10 platform and deployment system 3a and the arrangement of the corresponding parts of the unmanned vehicle landing platform and deployment system 3 are similar.

The unmanned vehicle landing platform and deployment system 3a
15 further comprises a movable hemispherical cover 601, which includes a hemispherical frame structure that is made of essentially non-magnetic and non-conductive material or any other material that does not interfere or hamper the operation of the unmanned vehicle 101, landing platform and deployment
20 system 3a, unmanned vehicle's integrated weather station and power module, and all other components present. The hemispherical frame structure is covered with an essentially non-conductive and non-magnetic material that does not contain any metallic component or any other material that does not
25 pose limitations to the operation of the unmanned vehicle 101, landing platform and deployment system 3a, unmanned vehicle's integrated weather station and power module, and all other components present. An example of such material is canvas and the content of this invention is not limited to this example.
30 The essentially non-conductive and non-magnetic material (or any other appropriate material) allows GPS/GNSS signals and radio waves to pass through with low or minimal attenuation of these signals.

The non-magnetic hemispherical cover 601 is pivotally connected to a motor 221 with a transmission mechanism. The transmission mechanism is not illustrated in the figure. The transmission mechanism is configured for transmitting and
5 converting a motor movement into a pivotal movement of the cover 601 for placing the cover 601 in an open state and in a closed state.

In the open state, the cover 601 is pivotally opened such that
10 a clear airspace above the landing pad 100 is provided, as shown in Fig. 6. This facilitates drone landing while the open cover 601 acts to provide protection against wind for the unmanned vehicle 101.

15 In the closed state, the cover 601 is pivotally closed such that it covers the landing pad 100 and the landed unmanned vehicle 101 entirely, as shown in Fig. 7. The closed cover 601 provides a protection for the landed unmanned vehicle 101 and for the landing pad 100 against rain, snow, wind, ice, dust,
20 dirt, volcanic ashes, human or animal threats or any other unexpected events. This provides a safe storage space for protecting the unmanned vehicle 101 against varying weather or environmental conditions, which can cause damage to the unmanned vehicle 101 or the modules that are needed to operate
25 the unmanned vehicle.

The hemispherical shape of the cover 601 allows rain water, snow, ice, dust, or ashes that can be accumulated on surfaces of the cover 601 to wash away from the surfaces easily,
30 especially when the cover 601 is placed in the open state. This can prevent foreign objects from accumulating over the landing platform and deployment system.

In a further implementation, the cover 601 provides stealth protection for the unmanned vehicle 101, wherein the cover 601 is camouflaged and blend into its surrounding environment.

5 Different implementation of the movable cover 601 is possible such as providing storage and protection for not only for the landing platform and deployment system 3a, but also for the storage and protection of the other modules needed for the operation of the unmanned vehicle.

10

Fig. 8 shows a different cover 601a. The cover 601a includes a horizontally movable cover portion 603 and a fixed covered portion 607. The movable cover portion 603 is movably attached to the fixed covered portion 607.

15

The movable cover portion 603 includes a horizontally movable frame structure that is covered with canvas. The frame structure includes a body part and a roof part, which is attached to a top side of the body part. The roof part has a shape of, for example, a gable roof. The gable roof has two roof sections, which are connected to each other such that the roof sections slope in opposite directions. The frame structure is made of non-magnetic and non-conductive material or any other appropriate material that does not block the communication signals.

20

25

The fixed cover portion 607 includes a stationary vertical frame, which is covered with canvas. The vertical frame has a shape that corresponds to a shape of a vertical side of the movable frame structure of the movable cover portion 603. The vertical frame is made of non-magnetic and non-conductive material or any other appropriate material that does not block the communication signals.

30

The movable cover portion 603 can be moved linearly by a transmission mechanism, such as a belt drive, which is actuated by a motor. The transmission mechanism is configured for transmitting and converting movements of the motor into
5 linear movements for moving the movable cover portion 603.

The cover 601a can be placed in an open state and in a closed state.

10 In the open state, the movable cover portion 603 is moved or shifted linearly away from the landing pad 100 such that a clear air space above the landing pad 100 is provided.

In the closed state, the movable cover portion 603 is moved or
15 shifted linearly towards the landing pad 100 until the movable cover portion 603 is connected to the fixed cover portion 607 to form an enclosure for covering the landing pad 100 and the landed unmanned vehicle 101 entirely.

20 Different implementations of the unmanned vehicle landing platform and deployment system 3a are possible.

In one implementation, the unmanned vehicle deployment system 3a includes a plurality of motors to separately move the
25 adjustment beams 201, 202, 211, and 212, and the movable cover 601 and 601a.

In a further implementation, the cover 601 and 601a is configured to cover not only the landing pad 100 and the
30 landed unmanned vehicle 101, but also to cover the unmanned vehicle's integrated weather station and power module 31.

In a further implementation, the unmanned vehicle deployment system 3a further includes a battery-powered fan unit for

providing air ventilation within a cover 601 and 601a when the cover 601 and 601a covers the landing pad 100 and/or the unmanned vehicle 101. The fan unit can be thermostatically controlled, either by a standalone thermostat or by the
5 processing unit 128, which activates the fan unit when temperature inside the cover 601 and 601a is higher than a predetermined temperature and initiate the cooling of the module to prevent damages to the landing platform and deployment system and all the other peripherals integrated to
10 it. In another implementation, a refrigeration type device is used to control the thermal management aspects of the landing platform and deployment system, unmanned vehicle while it is being stored inside the landing platform and deployment system, etc. instead of the fan where it is deemed necessary
15 for reasons of having the fan cooling being not sufficient.

In another implementation, the cover 601 and 601a is adapted for transport of the landing pad 100 and the unmanned vehicle 101.

20

The unmanned vehicle landing platform and deployment system 3a can be powered by an electric power supply grid, or by batteries, which can be electrically charged using solar cells, wind generators, stand-alone petrol, diesel, natural
25 gas, bio-mass fueled gen-sets, and/or fuel cells, or any other relevant power source including the grid supply. The electric power supply grid acts a channel to transmit electricity from an electric power plant. The following power sources can also be utilized by the system: internal combustion engines, solar
30 power, photovoltaic arrays, hydrothermal power, radioisotope or radioactive power systems, nuclear fission based power generators, thermal energy conversion devices, Stirling convertors, Brayton converters, Rankine converters, micro-miniature dynamic power converters that are integrated with

radioisotope heater units, alpha/beta-voltaic energy conversion devices, bio-inspired power generation devices, etc. The content of this invention is not limited to the type of power used and with the appropriate design considerations
5 and use of the right materials/hardware, different power sources can easily be utilized to obtain a landing platform and deployment system with improved charging properties to not only charge the unmanned vehicle's depleted power source, but the same landing platform and deployment system can also be
10 used for landing, receiving, storing and numerous other processes that are relevant to the operation and charging of the unmanned vehicle.

For example, the battery or energy storage and conversion
15 device or power module 122 can be powered by a solar power system. The solar power system can, for example, include a solar panel and a current converter, wherein the solar panel can be installed on the post that carries the sensor array. Alternatively, the solar power system can include a solar
20 pond, a parabolic collector and/or a solar power tower. In another embodiment, the solar cells or photovoltaic cells can be attached to the body of the landing platform and deployment system or it can be a stand-alone separate unit. In another embodiment, the power module 122 has the capability of
25 receiving electricity from multiple sources such as solar module, wind module, hydrothermal module, electricity from the grid, or have its own electrochemical energy storage and conversion mechanisms and devices such as fuel cells, hydrogen fuel cells, backup batteries, UPS modules, etc.

30

Fig. 9 shows a schematic aerial view of an unmanned vehicle landing platform and deployment system 5 that has the capability of storing multiple unmanned vehicles and charging them either one at a time or simultaneously. The unmanned

vehicle landing platform and deployment system 5 comprises an unmanned vehicle storage box 400, an unmanned vehicle 101, and a unmanned vehicle's integrated weather station and power module 31. The unmanned vehicle's integrated weather station and power module 31 is electrically connected to the unmanned vehicle storage box 400 and is communicatively connected to the unmanned vehicle 101.

The unmanned vehicle storage box 400 includes a roof landing platform 410 and a plurality of unmanned vehicle hangar modules 430 that are arranged in a vertical stack. The roof landing platform is placed on top of the unmanned vehicle hangar modules 430.

The roof landing platform 410 includes a landing pad 100 with a first contact surface 111 and with a second contact surface 112, a first longitudinal adjustment beam 201, a second longitudinal adjustment beam 202, a first lateral adjustment beam 211, a second lateral adjustment beam 212, a motor 221 with a transmission mechanism, and a non-magnetic (or another appropriate material based) movable cover 601a. These parts correspond to the parts of the unmanned vehicle deployment system 3a. An arrangement of these parts and the arrangement of the corresponding parts of the unmanned vehicle deployment system 3a are also similar.

The roof landing platform 410 further includes an unmanned vehicle presence sensor 240 for detecting the presence of an unmanned vehicle 101 that has landed on the landing pad 100.

As better seen in Fig. 10, each of the unmanned vehicle hangar modules 430 includes an unmanned vehicle container 440, a movable unmanned vehicle landing platform 470, and a unmanned vehicle landing platform extension mechanism 490. The unmanned

vehicle container 440 is connected to the unmanned vehicle platform extension mechanism 490, which is connected to the unmanned vehicle landing platform 470.

- 5 The unmanned vehicle container 440 includes a horizontally movable unmanned vehicle landing deck 441 with one vertical side panel 442, and three fixed vertical side panels 445. The vertical side panel 442 is attached to an edge of the unmanned vehicle landing deck 441. The unmanned vehicle landing deck
10 441 is configured to be moved to a position such that the unmanned vehicle landing deck 441 is surrounded by the fixed vertical side panels 445 and the vertical side panel 442.

The unmanned vehicle landing deck 441 is made of non-magnetic
15 material (or any other appropriate material that does not block the communication signals) while each of these side panels 442 and 445 includes a rectangular non-magnetic (or any other appropriate material that does not block the communication signals) frame structure that is covered with
20 canvas. The unmanned vehicle landing deck 441 is connected to the unmanned vehicle landing platform 470 such that the unmanned vehicle landing platform 470 is placed on the unmanned vehicle landing deck 441.

- 25 The unmanned vehicle landing platform 470 includes parts that correspond to parts of the improved landing platform 90 of the unmanned vehicle deployment system 3a. An arrangement of these parts and the arrangement of the corresponding parts of the improved landing platform 90 are also similar.

30

The unmanned vehicle landing platform 470 further includes an unmanned vehicle presence sensor 250 for detecting a presence of an unmanned vehicle 101 that has landed on the landing pad 100.

The unmanned vehicle platform extension mechanism 490 is configured to move the unmanned vehicle landing-cum-storage tray, thereby moving unmanned vehicle landing platform 470
5 into and outside the unmanned vehicle container 440.

Each hangar module 430 is adapted such that it provides a storage state and a unmanned vehicle landing or takeoff state. In the storage state, the unmanned vehicle platform extension
10 mechanism 490 and the unmanned vehicle landing platform 470 are positioned inside the unmanned vehicle container 440. In the landing state or the takeoff state, the unmanned vehicle platform extension mechanism 490 moves the unmanned vehicle landing platform 470 outside the unmanned vehicle container
15 440.

The unmanned vehicle hangar modules 430 further includes a battery-powered fan unit for providing air ventilation within the unmanned vehicle hangar modules 430 when the hangar module
20 430 is placed in the storage state.

The unmanned vehicle's integrated weather station and power module 31 includes an enclosure box 321 that encloses a processing unit 128, a plurality of polarity switches 121, and
25 a battery or power module 122. The unmanned vehicle's integrated weather station and power module 31 also includes a post that carries a sensor array. The processing unit 128 is electrically connected to the polarity switches 121 and to the sensor arrays. Each of the polarity switches 121 is
30 electrically connected to contact surfaces 111 and 112 of a landing pad 100 of the corresponding hangar module 430 and is electrically connected to electric poles 123 and 124 of the battery or power module 122.

These parts correspond to the parts of the unmanned vehicle's integrated weather station and power module 31 of the unmanned vehicle landing platform and deployment system 3a. An arrangement of these parts and the arrangement of the
5 corresponding parts of the unmanned vehicle's integrated weather station and power module 31 of the unmanned vehicle landing platform and deployment system 3a are also similar.

In use, the processing unit 128 serves to manage or direct
10 parts of the unmanned vehicle hanger modules 430 and of the roof landing platform 410.

Each unmanned vehicle hangar module 430 provides a platform for an UVA 101 to land. The unmanned vehicle hangar module 430
15 can then store and protect the unmanned vehicle 101 as well as electrically charge a battery (or the energy storage and conversion module) of the unmanned vehicle 101. The unmanned vehicle hangar module 430 also allows the unmanned vehicle 101 to take off.

20 The unmanned vehicle presence sensors 240 and 250 act to detect the presence of an unmanned vehicle 101 that has landed and/or stored at the roof landing platform and inside the unmanned vehicle hanger modules 430 and to transmit an
25 unmanned vehicle detection signal to the processing unit 128.

When an unmanned vehicle 101 is requesting to land into the unmanned vehicle storage box 400, the processing unit 128 then selects one of the unoccupied unmanned vehicle hangar modules
30 430 and the roof landing platform 410 according to the unmanned vehicle detection signals received from the presence sensors 240 and 250 for placing the selected unmanned vehicle hangar modules 430 in an unmanned vehicle landing state.

The processing unit 128 later places the unmanned vehicle container 440 of the selected unmanned vehicle hangar module 430 in a container open state, wherein the unmanned vehicle landing deck 441 with the side panels 442 is placed apart from
5 the fixed panels 445.

In detail, the processing unit 128 activates the unmanned vehicle platform extension mechanism 490 to move the unmanned vehicle landing deck 441 together with the side panel 442 away
10 from the fixed vertical side panels 445, thereby placing the container 440 in the open state. The unmanned vehicle platform extension mechanism 490 also moves the unmanned vehicle landing platform 470 away from the unmanned vehicle container 440 to a landing position for receiving an unmanned vehicle
15 101. In other words, the unmanned vehicle landing platform 470 is exposed for receiving the unmanned vehicle 101.

After the unmanned vehicle 101 has landed on the landing pad 100 of the unmanned vehicle landing platform 470, the unmanned
20 vehicle positional alignment unit 198 moves the unmanned vehicle 101 to a center of the landing pad 100. The processing unit 128 later activates the unmanned vehicle platform extension mechanism 490 to move the unmanned vehicle landing platform 470 together with the landed unmanned vehicle 101
25 inside the container 440.

The processing unit 128 afterward directs the battery or power module 122 to provide electricity to the contact surfaces 111 and 112 of the landing pad 100 for charging the battery (or
30 powering device) of the unmanned vehicle 101.

In one embodiment, the unmanned vehicle deployment system 5 further includes brushes, which are provided in the proximity of the contact surfaces 111 and 112. The brushes are intended

for sweeping away any foreign object which falls onto the contact surfaces 111 and 112 and may interfere with the charging process or any other operation. These foreign objects can be introduced when the containers 440 and/or the cover 5 601a are placed in the open state.

The unmanned vehicle deployment system 3, 3a and 5 provides several benefits.

10 The unmanned vehicle landing platform and deployment system 3, 3a and 5 can efficiently move an unmanned vehicle 101 to a charging position by the unmanned vehicle positional alignment unit 198 for charging of the unmanned vehicle 101 once the unmanned vehicle 101 has landed. Furthermore, parts of the
15 unmanned vehicle landing platform and deployment system 3, 3a and 5 are substantially made of non-magnetic materials (or any other appropriate material), which essentially is a material with a composition that does not interfere electromagnetic waves or communication signals. This allows the unmanned
20 vehicle 101 to receive and to transmit radio frequency signals even the unmanned vehicle 101 is placed inside the cover 601a or inside the unmanned vehicle container 440.

In summary, the application provides an unmanned vehicle
25 landing platform and a deployment system with an improved charging system, comprising a landing pad, a polarity switch, and a battery (or a power module). Therein, the landing pad comprises a first contact surface electrically connected to the polarity switch and a second contact surface electrically
30 connected to the polarity switch. The polarity switch is further electrically connected to a positive pole of the battery (or power module) and to a negative pole of the battery (or a power module). The polarity switch is configured to electrically connect the first contact surface with the

positive pole and the second contact surface in a first polarity state with the negative pole, or to electrically connect the first contact surface with the negative pole and the second contact surface with the positive pole in a second polarity state. The polarity switch may also comprise a third polarity state, wherein the contact surfaces and the battery (or power module) poles are electrically disconnected in order to prevent damage. The contact surfaces are rectangular metal surfaces positioned centrally on the landing pad, opposite of each other. Therein, the first contact surface is positioned with a minimum distance to the second contact surface, such that a typical electrode cannot possibly short-circuit the first contact surface and the second contact surface.

15 The first contact surface is configured to electrically contacting a positive electrode of a unmanned vehicle, and the second contact surface is configured to electrically contacting a negative electrode of the unmanned vehicle, at the same time. Therein, if the unmanned vehicle is turned by 90 degrees counter-clockwise, the electrical contact between the electrodes and the contact surfaces is maintained. Therein, the polarity switch is in a first polarity state, such that the unmanned vehicle may be charged by the battery (or a power module).

25 If the unmanned vehicle is turned by 180 degrees, or by 90 degrees clockwise, the first contact surface electrically contacts a negative electrode, and the second contact surface electrically contacts a positive electrode, at the same time. Therein, the polarity switch is in a second polarity state, such that the unmanned vehicle may be charged by the battery (or power module). The polarity switch selects the polarity state automatically. For example, the polarity state can be selected based on a voltage sensor. Therein, the voltage

sensor may determine a direction of a voltage between positive electrode and the negative electrode, and select a polarity state accordingly. In another example, the polarity state can be selected based on a position sensor, like a magnetic
5 position sensor, a mechanic position sensor, an optical position sensor, or a capacitive position sensor. Therein, the position sensor can be a simple sensor, since it is merely necessary to distinguish two position variants.

10 In one embodiment, the first contact surface has the shape of a semi-disk, and the second contact surface has the shape of a semi-disk, wherein the two contact surfaces are positioned centrally on the landing pad, opposing one another. The contact surfaces can have any suitable different shape and
15 position on the landing pad. Therein, each contact surface preferably covers at least a substantial portion of two corners of a rectangular sized to match the size of a typical unmanned vehicle. For example, a typical unmanned vehicle can be of square shape, 2m wide, and 2m long. Each contact surface
20 can be a half-circle with 2.4m diameter. The specific numbers provided here are only for explanation reasons and this application is not limited to these stated example figures.

The application also provides a self-adjusting (or self-aligning) unmanned vehicle landing system comprising the
25 unmanned vehicle charging system. The unmanned vehicle landing system provides an unadjusted (unaligned) state and an adjusted (aligned) state.

30 In the unadjusted (unaligned) state, a first longitudinal adjustment beam and a second longitudinal adjustment beam sit atop the landing pad along two opposing edges of the landing pad. The longitudinal adjustment beams are movable against each other along a longitudinal direction. A first lateral

adjustment beam and a second lateral adjustment beam sit atop the landing pad along two opposing edges of the landing pad. The lateral adjustment beams are movable against each other along a lateral direction. The adjustment beams are further
5 connected to a motor by a gear drive, by a belt drive, or by a linear actuator. Therein, the adjustment beams can be guided using guide rails.

The landing pad is configured for a unmanned vehicle to land
10 on the landing pad within an area bounded by the adjustment beams. Hereto, the adjustment beams are maximally divided when the self-adjusting unmanned vehicle landing system is in an unadjusted state. Once the unmanned vehicle has landed on the landing pad, the motor drives the adjustment beams to move
15 towards a center of the landing pad. At one point in time, the first lateral adjustment beam touches a part of the unmanned vehicle and pushes the unmanned vehicle towards the center of the landing pad. Depending on the initial landing position of the unmanned vehicle, alternatively the second lateral
20 adjustment beam could have touched a part of the unmanned vehicle and pushed the unmanned vehicle towards the center of the landing pad. Analogously, at one point in time, the second longitudinal adjustment beam touches a part of the unmanned vehicle and pushes the unmanned vehicle it towards the center
25 of the landing pad. Depending on the initial landing position of the unmanned vehicle, alternatively the first longitudinal adjustment beam could have touched a part of the unmanned vehicle and pushed the unmanned vehicle towards the center of the landing pad.

30

Initially, the polarity switch is in a third polarity state, wherein none of the contact surfaces is connected to the battery. Depending on the landing position of the unmanned vehicle within the landing pad, one of the positive electrode

and the negative electrode can be initially contacted to either the first contact surface or the second contact surface. Alternatively, both the positive electrode and the negative electrode can be initially contacted to one of the
5 contact surfaces, respectively. Typically, initially neither the positive electrode nor the negative electrode is contacted to any of the first contact surface or the second contact surface.

- 10 In the adjusted state, the first longitudinal adjustment beam and the second longitudinal adjustment beam have been moved towards the center of the landing pad. Thereby, the unmanned vehicle has been pushed towards the center of the landing pad and thereby been adjusted, or aligned, along the second
15 longitudinal adjustment beam. At the same time, the unmanned vehicle has likewise been pushed towards the center and at the same time adjusted, or aligned, along the first lateral adjustment beam.
- 20 Eventually, the positive electrode contacts the first contact surface and the negative electrode contacts the second contact surface. Alternatively, the positive electrode could have contacted the second contact surface and the negative electrode could have contacted the first contact surface,
25 depending on the initial position and alignment of the unmanned vehicle.

- Once both electrodes of the unmanned vehicle contact one of the contact surfaces of the landing pad, the polarity switch
30 switches to a first polarity state or to a second polarity state, depending on which electrode is contacted to which contact surface. The polarity switch is configured to electrically connect the first contact surface with the positive pole and the second contact surface in a first

polarity state with the negative pole, or to electrically connect the first contact surface with the negative pole and the second contact surface with the positive pole in a second polarity state. Since the first contact surface is
5 electrically contacting the positive electrode, and the second contact surface is electrically contacting the negative electrode of the unmanned vehicle, the polarity switch is in a first polarity state, such that the unmanned vehicle may be charged by the battery. If the first contact surface was
10 electrically contacting the negative electrode, and the second contact surface was electrically contacting the positive electrode, the polarity switch would be switched to a second polarity state, such that the unmanned vehicle would also be charged by the battery (or power module).

15
Once an electrical connection between the unmanned vehicle and the battery (or a power module) is established, the motor stops, since the goal of the automatic adjustment is achieved and the possibility of damage to the unmanned vehicle is to be
20 avoided.

The application also provides an unmanned vehicle deploying system comprising the self-adjusting unmanned vehicle landing platform and deployment system. The unmanned vehicle landing
25 platform and deploying system includes a landing pad with a first contact surface, a second contact surface, a first longitudinal adjustment beam, a second longitudinal adjustment beam, a first lateral adjustment beam, a second lateral adjustment beam, a motor, and a transmission mechanism for
30 transmitting the motor movement into linear movement of the adjustment beams.

Further, the unmanned vehicle landing platform and deploying system includes an unmanned vehicle comprising a positive

electrode and a negative electrode. The unmanned vehicle further comprises a beacon unit.

5 The beacon unit includes an infrared (IR) light source with visible light sources and a cover plate. The infrared light source, the visible light sources, and the cover plate are mounted on a top surface of the unmanned vehicle. The cover plate includes a plurality of openings and it is placed above the infrared light source and the visible light sources.

10

In use, the infrared (IR) light source emits light rays, which pass through the openings of the cover plate to form an infrared pattern. The camera senses the infrared pattern for guiding the unmanned vehicle towards the landing platform.

15 Similarly, the visible light sources emit visible light rays, which pass through the openings of the cover plate to form the visible light ray pattern. The camera senses the visible light pattern for guiding the unmanned vehicle towards the landing platform.

20

The different types of light rays are used in different situations. In the event of rain, which can block the infrared light rays and cause difficulty in detecting the infrared light rays, the visible light rays are used for guiding the unmanned vehicle. In the event of strong sunshine, which causes difficulty in detection of the visible lights, the infrared light rays are used for guiding the unmanned vehicle.

30 In a further embodiment, the visible light rays are replaced by laser light rays. The laser light rays are emitted coherently, thereby allowing them to be easily focused. The wavelength of the laser light rays can be adapted or selected such the laser light rays can penetrate certain objects, such as haze or rain.

Further, the unmanned vehicle deploying system includes a
unmanned vehicle's integrated weather station and power module
with storing functionality, which comprises an enclosure box,
5 and a post carrying a sensor array. The enclosure box
comprises a polarity switch, a battery or a power module, and
a processing unit. The battery (or power module) is
electrically connected to the polarity switch as described
above, and the polarity switch is further electrically
10 connected to the contact surfaces of the landing pad as
described above. The processing unit is connected to each of
the sensors of the sensor array. Further, the processing unit
is connected, preferably using a wireless connection via the
network unit (though the content of this invention is not
15 limited to wireless connection approach), to the unmanned
vehicle. The processing unit receives sensor data from the
unmanned vehicle and sends command data to the unmanned
vehicle.

20 The sensor array includes at least an anemometer, also called
a wind gauge, a temperature sensor, a weather vane, a camera,
and a network unit. Other desired sensors such as a hyper-
local weather sensor or device can also be included into the
sensor array to further improve the safe operation of the
25 unmanned vehicle. In another embodiment, the camera can be
used not only to monitor the security, but also enable the
virtual-line-of-sight feature in order to eliminate the need
for a person to be physically there during the mission and
meet the local regulations by using the camera as a smart
30 device to have the virtual-line-of-sight feature. The said
virtual-line-of-sight feature can easily be transferred to the
operator that is monitoring the status of the mission or it
can be transferred to the on-board computer of the unmanned
vehicle or having this feature provided to the ground computer

located within the landing platform and deployment system or within the weather station module in order to have their own virtual-line-of-sight for improved autonomous flight activities and meeting the local safety and flight regulations.

The anemometer, the temperature sensor, and the weather vane send their sensor data to the processing unit. The sensor array can hold further sensors, in particular weather sensors (such as hyper-local weather sensors to gain information for the local weather with high accuracy within the flight altitude of the unmanned vehicle) and ambience sensors, the respective sensor data of which is also sent to the processing unit. The processing unit aggregates the sensor data for detecting the presence of rain, snow, hail, storm, blizzard, etc. and further weather phenomena. The use of the processing unit and the sensor array to detect the presence of rainfall or snowfall conditions may facilitate the processing unit to autonomously manage the decision-making process in regard to determining whether the unmanned vehicle may be permitted to take-off or land under varying degrees of severity of rainy or snowy environmental conditions. The processing unit may transmit, via the network unit, a command to the unmanned vehicle in response to this decision-making process. For example, the processing unit might transmit a command to the unmanned vehicle instructing the unmanned vehicle to initiate landing in reaction to detecting upcoming heavy rainfall. In another example, the processing unit might transmit a command to the unmanned vehicle instructing the unmanned vehicle to postpone landing, or even to leave the area, in reaction to detecting strong wind.

The camera captures images of light signals of the beacon unit and sends the image data to the processing unit. The camera

comprises a visible light ray camera and an infrared light ray camera. The visible light ray camera is intended for receiving the visible light ray. The received visible light ray is used for guiding the unmanned vehicle to the landing platform.

5 Similarly, the infrared light ray camera is intended for receiving the infrared light ray. The received infrared light ray is used for guiding the unmanned vehicle to the landing platform.

10 The different types of light rays are used advantageously in different situations. In the event of rain, which can block the infrared light rays and cause difficulty in detection of the infrared light rays, the visible light rays are used for guiding the unmanned vehicle to the landing platform. In the
15 event of strong sunshine, which causes difficulty in detection of the visible lights, the infrared light rays are used for guiding the unmanned vehicle to the landing platform.

In another embodiment, the camera on-board the unmanned
20 vehicle detects the QR code that is integrated into the landing platform and facilitates the precision landing process.

The unmanned vehicle landing platform and deploying system can
25 further comprises a cover (electric cover or other approaches) of a desired shape and geometry, which is configured to clear airspace in an opened state and to cover the landing pad entirely in a closed state. In the opened state, the cover is configured to facilitate drone landing by providing protection
30 against wind while not getting in the way of the unmanned vehicle. The unmanned vehicle landing platform and deploying system further comprises a motor, and a transmission mechanism. The transmission mechanism is configured for transmitting the motor movement into linear movement of the

adjustment beams and into pivot movement of the electric cover.

5 In an alternative embodiment, the transmission mechanism is configured for transmitting the motor movement into linear movement of the adjustment beams and into linear movement of an electric cover, wherein the electric cover is shifted from the landing pad and back onto the landing pad.

10 In yet another alternative embodiment, the unmanned vehicle deploying system might include a number of motors to drive the adjustment beams and the electric cover.

15 During rainfall or snowfall conditions, the sensor array sends sensor data to the processing unit to initiate certain measures. Once the processing unit has detected the rainfall or snowfall conditions, it may transmit the necessary command signal to close the cover.

20 In the closed state, the cover provides protection for the unmanned vehicle and for the landing pad against rain, snow, wind, and dirt. Further, the electric cover provides protection against stealth of the unmanned vehicle, wherein the electric cover may be camouflaged according to its
25 environment.

In an alternative embodiment, the electric cover covers not only the landing pad and the unmanned vehicle, but also the storage device.

30

In an alternative embodiment, the electric cover is adapted for transport of the landing pad and the unmanned vehicle without causing any damages to the parts or components.

Fig. 11 describes the basic schematic of a landing platform and deployment system 700 that is comprised of an unmanned vehicle 716 and a moveable landing platform 704 that can ingress and egress depending on the need with closed and open states. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing platform with smart landing and alignment mechanisms 703 is raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 has full airspace, the unmanned vehicle takes off for its designated mission, then landing platform 703 is retracted back and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to the landing platform and deployment system for its storing, self-alignment and charging activities (also known as closed stated for the landing platform and deployment state). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a signal for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700. If everything is OK for the landing in terms of environmental and weather conditions, a confirmation signal is sent to the unmanned vehicle to continue its approach for landing, then the doors 701 are opened, and then the landing platform 703 with smart landing mechanisms located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle completes the landing process, then doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging

region (which is also known as landing platform 703) until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle to the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 starts to move towards each other (and also orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and second alignment beam/mechanism and electrical contact between the negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the second alignment beam/mechanism for the charging of the on-board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 connected to the and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the secondary alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in

the previous examples/embodiments can also be used for this embodiment.

Fig. 12 describes the basic schematic of a landing platform and deployment system 700 that is comprised of an unmanned vehicle 716 and a moveable landing platform 704 and also have an integrated power module, weather station, communication/control module, and the improved charging mechanism. The landing platform and deployment system 700 can have open state and closed states for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting on the landing platform with smart landing and alignment mechanisms 703 is raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 has full airspace, the unmanned vehicle takes off for its designated mission, then landing platform 703 is retracted back and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to the landing platform and deployment system for its storing, self-alignment and charging activities (also known as closed state for the landing platform and deployment state). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a signal for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700. The ground processing unit (which is existing either within the landing platform and deployment system 700 or within the integrated power module 122, weather station 706, communication/control module 707, and the improved charging mechanism 121) makes a decision based on the sensor data aggregated from the sensors on-board of the

weather station 706 and then sends a "landing is OK" signal or "landing is refused" signal to the unmanned vehicle 716 by using the communication/control module 707. If the signal is sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform 703 with smart landing mechanisms located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle completes the landing process, then doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing platform 703) until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle to the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 starts to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and second alignment beam/mechanism and electrical contact between the negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the second alignment beam/mechanism for the charging of the on-board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the

positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 connected to the and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the
5 power module 122 via electrical contact that is established by the secondary alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard
10 powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this
15 embodiment.

Fig. 13 describes the basic schematic of a landing platform and deployment system 700 that is comprised of an unmanned vehicle 716 and a moveable landing platform with a QR code 708
20 and also have an integrated power module, weather station, communication/control module, and the improved charging mechanism. The landing platform and deployment system 700 can have open state and closed states for its operations. The open state enables the deployment of the unmanned vehicle and
25 the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing platform with smart landing and alignment mechanisms 703 is raised to the surface
30 by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 has full airspace, the unmanned vehicle takes off for its designated mission, then landing platform 703 is retracted back and then the doors 701 are closed. After the completion

of the mission, the unmanned vehicle returns to the landing platform and deployment system for its storing, self-alignment and charging activities (also known as closed state for the landing platform and deployment state). As the unmanned

5 vehicle 716 approaches the landing platform and deployment system 700, it sends a signal for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700. The ground processing unit (which is existing either within the landing platform and deployment

10 system 700 or within the integrated power module 122, weather station 706, communication/control module 707, and the improved charging mechanism 121) makes a decision based on the sensor data aggregated from the sensors on-board of the weather station 706 and then sends a "landing is OK" signal or

15 "landing is refused" signal to the unmanned vehicle 716 by using the communication/control module 707. If the signal is sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code 708 with smart landing

20 mechanisms located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code that is located on the landing platform 708 and

25 uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, after the completion of the landing process the doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716

30 toward the predetermined charging region (which is also known as landing platform 703) until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle to the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent

crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and second alignment beam/mechanism and electrical contact between the negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the second alignment beam/mechanism for the charging of the on-board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 connected to the and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the secondary alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this embodiment.

Fig. 14 describes an alternative embodiment that is provided in Fig. 13 for an improved landing platform and deployment

system 700 that is comprised of an unmanned vehicle 716 and a moveable landing platform with a QR code and a recessed area 709, have an integrated power module, weather station, communication/control module, and the improved charging mechanism, and also a fence 710 with an active deterring mechanism. The landing platform and deployment system 700 can have open state and closed states for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting on the landing platform with smart landing and alignment mechanisms 703 is raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 has full airspace, the unmanned vehicle takes off for its designated mission, then landing platform 703 is retracted back and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to the landing platform and deployment system for its storing, self-alignment and charging activities (also known as closed state for the landing platform and deployment state). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a signal for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700. The ground processing unit (which is existing either within the landing platform and deployment system 700 or within the integrated power module 122, weather station 706, communication/control module 707, and the improved charging mechanism 121) makes a decision based on the sensor data aggregated from the sensors on-board of the weather station 706 and then sends a "landing is OK" signal or "landing is refused" signal to the unmanned vehicle 716 by using the communication/control module 707. If the signal is

sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a recessed landing area 709 with smart landing mechanisms located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code 709 that is located on the landing platform 703 with a recessed area and uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, the unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned vehicle on the surface of the landing platform 703 and a recessed area is needed in order to prevent the skidding off the unmanned vehicle from the landing platform 703 during abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing platform 703) until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle to the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and second alignment beam/mechanism and electrical contact between the negative terminal charging contact #2 (which is labeled 720) attached to the landing

mechanism of the unmanned vehicle 716 and the second alignment beam/mechanism for the charging of the on-board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via
5 using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 connected to the and negative pole 721 of the on-board power
10 module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the secondary alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved
15 charging mechanism detects the polarity of the onboard powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in
20 the previous examples/embodiments can also be used for this embodiment. In order to maintain the security and safety of the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle), a fence 710 with an active deterring
25 mechanism such as electrical shocking can be utilized to keep away animals and humans from tampering or harming the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle such as power module 122 that is needed to charge the
30 unmanned vehicle's on-board powering device 718, weather station and its sensors 706, communication/control module 707, an improved charging mechanism 121, etc.)

Fig. 15 describes an alternative embodiment that is provided in Fig. 14 for an improved landing platform and deployment system 700 that is comprised of an unmanned vehicle 716 and a moveable landing platform with a QR code and a recessed area

5 709, have an integrated advanced power module (that is comprised of fuel cell systems 726, battery or other power sources 727, security device 728), switchable rectifier setup 121, an advanced weather station 712, communication/control module 707, a weed-killer and insecticide/pesticide killer

10 715, a camera 714, a communication device 713, a source of renewable power such as solar cell module 725 (which is collectively called Remobox station 711), and also a fence 710 with an active deterring mechanism. The landing platform and deployment system 700 can have open state and closed states

15 for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing

20 platform with smart landing and alignment mechanisms 703 is raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 has full airspace, the unmanned vehicle takes off for its designated mission, then

25 landing platform 703 is retracted back and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to the landing platform and deployment system for its storing, self-alignment and charging activities (also known as closed stated for the landing platform and deployment

30 state). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a signal for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700. The ground processing unit (which is existing either within the landing

platform and deployment system 700 or within the integrated power module 122, weather station 706, communication/control module 707, and the improved charging mechanism 121) makes a decision based on the sensor data aggregated from the sensors on-board of the weather station 706 and then sends a "landing is OK" signal or "landing is refused" signal to the unmanned vehicle 716 by using the communication/control module 707 or 713. If the signal is sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a recessed landing area 709 with smart landing mechanisms located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code 709 that is located on the landing platform 703 with a recessed area and uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, the unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned vehicle on the surface of the landing platform 703 and a recessed area is needed in order to prevent the skidding off the unmanned vehicle from the landing platform 703 during abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing platform 703) until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle to the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 start to move towards each other (which

are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and second alignment beam/mechanism and electrical contact between the negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the second alignment beam/mechanism for the charging of the on-board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the secondary alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this embodiment. The said Remobox station provides a complete power and sensing solution to further enhance the autonomous nature of the unmanned vehicle and its charging mechanism, in which a smart charging mechanism 121, a ground based electrical energy storage and conversion device such as a battery 122, a communication/control module 707, a fuel cell power system with its own dedicated fuel storage

726, additional battery based backup powering devices or any other relevant powering devices 727, a security device such as anti-theft or anti-tamper notification sensor 728, a security camera 714 with dual functionality of monitoring the
5 surroundings and also provide an additional tool to obtain virtual-line-of-sight feature, an advanced weather station with multiple sensors (including a hyper-local sensing device) 712, a weed/plant killer and insecticide/pesticide killer device 715 to keep the surroundings clear from weed/plant or
10 insecticide/pesticide infestation, a communication device 713 to send/receive signals, and a renewable energy generating device such as solar cells module or photovoltaics cells module to convert ambient/solar light into additional electricity are all integrated into a single box, and makes it
15 ideal for off-grid applications. In order to maintain the security and safety of the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle), a fence 710 with an active deterring mechanism such as electrical shocking can
20 be utilized to keep away animals and humans from tampering or harming the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle).

25 Fig. 16 describes an alternative embodiment that is provided in Fig. 15 for an improved landing platform and deployment system 700 that is comprised of an unmanned vehicle 716, a moveable landing platform with a QR code and a recessed area 709, a further improved Remobox station 711 with additional
30 interfaces to receive electricity from multiple different sources, a further improved charging mechanism 734 located on the base section of the landing platform 704 and also a fence 710 with an active deterring mechanism. The landing platform and deployment system 700 can have open state and closed

states for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing platform with smart landing and alignment mechanisms 703 is raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 with a QR code 709 and a recessed area for landing 709 has full airspace, the unmanned vehicle 716 takes off for its designated mission, then landing platform 703 is retracted back into the landing platform and deployment system 700 and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to the landing platform and deployment system 700 for its storing, self-alignment, and charging activities (also known as closed stated for the landing platform and deployment state 700). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a signal to the ground computer or processing unit for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700 (this processing unit can also be located inside the Remobox power and sensing station 711). The ground processing unit (which is existing either within the landing platform and deployment system 700 or within the Remobox station 711) makes a decision based on the sensor data aggregated from the sensors on-board of the weather station 706 and then sends a "landing is OK" signal or "landing is refused" signal to the unmanned vehicle 716 by using the communication/control module 707 or 713. If the signal is sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a recessed landing area 709 with smart landing mechanisms

located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code 709 that is located on the landing platform 703 with a recessed area and uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, the unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned vehicle on the surface of the landing platform 703 and a recessed area is needed in order to prevent the skidding off the unmanned vehicle from the landing platform 703 during abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing platform 703) until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle to the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and second alignment beam/mechanism and electrical contact between the negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 for the charging of the on-

board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential

5 that the positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the metallic

10 charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard

15 powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. The said landing platform and deployment system 700 also have a security device 728 such as an anti-theft or anti-tamper notification sensor that alerts the

20 authorized personnel in case its safety is being affected by an unauthorized entity. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this embodiment. The said further improved Remobox station

25 provides a complete power and sensing solution to further enhance the autonomous nature of the unmanned vehicle and its charging mechanism, in which a smart charging mechanism 121, a ground based electrical energy storage and conversion device such as a battery 122, a communication/control module 707, a

30 fuel cell power system with its own dedicated fuel storage 726, additional battery based backup powering devices or any other relevant powering devices 727, has the interface to accept electrical energy from other sources existing nearby such as a solar farm or a wind farm, or any other renewable or

non-renewable power producing devices or power plants, a security device such as anti-theft or anti-tamper notification sensor 728, a security camera 714 with dual functionality of monitoring the surroundings and also provide an additional tool to obtain virtual-line-of-sight feature, an advanced weather station with multiple sensors (including a hyper-local sensing device) 712, a weed/plant killer and insecticide/pesticide killer device 715 to keep the surroundings clear from weed/plant or insecticide/pesticide infestation, a communication device 713 to send/receive signals, and a renewable energy generating device such as solar cells module or photovoltaics cells module to convert ambient/solar light into additional electricity are all integrated into a single box, and makes it ideal for off-grid applications. In order to maintain the security and safety of the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle), a fence 710 with an active deterring mechanism such as electrical shocking can be utilized to keep away animals and humans from tampering or harming the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle).

Fig. 17 describes an alternative embodiment that is provided in Fig. 16 for an improved landing platform and deployment system 700 that is comprised of a solar cells module 725 integrated into the body of the landing platform and deployment system 700, an unmanned vehicle 716 with on-board charging mechanism attached to its body, a moveable landing platform with a QR code and a recessed area 709, a further improved Remobox station 711 with additional interfaces to receive electricity from multiple different sources, a further improved charging mechanism 734 located on the base section of

the landing platform 704 and also a fence 710 with an active deterring mechanism. The landing platform and deployment system 700 can have open state and closed states for its operations. The open state enables the deployment of the
5 unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing platform with smart landing and alignment mechanisms 703 is
10 raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 with a QR code 709 and a recessed area for landing 709 has full airspace, the unmanned vehicle 716 takes off for its designated mission,
15 then landing platform 703 is retracted back into the landing platform and deployment system 700 and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to the landing platform and deployment system 700 for its storing, self-alignment, and charging activities
20 (also known as closed stated for the landing platform and deployment state 700). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a signal to the ground computer or processing unit for landing and awaits for a confirmation from the processing unit of the
25 landing platform and deployment system 700 (this processing unit can also be located inside the Remobox power and sensing station 711). The ground processing unit (which is existing either within the landing platform and deployment system 700 or within the Remobox station 711) makes a decision based on
30 the sensor data aggregated from the sensors on-board of the weather station 706 and then sends a "landing is OK" signal or "landing is refused" signal to the unmanned vehicle 716 by using the communication/control module 707 or 713. If the signal is sent is landing is OK, then the unmanned vehicle

continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a recessed landing area 709 with smart landing mechanisms located on the base section 704 is raised with the movement of

5 lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code 709 that is located on the landing platform 703 with a recessed area and uses this QR code for the precision landing

10 of the unmanned vehicle 716 onto the landing platform 703, the unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned vehicle on the surface of the landing platform 703 and a recessed area is needed in order to prevent the skidding off

15 the unmanned vehicle from the landing platform 703 during abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the

20 predetermined charging region (which is also known as landing platform 703) until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle to the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to

25 the unmanned vehicle 716, then second alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the

30 positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and metallic charging plate 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 and electrical contact between the

negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment

5 beams/mechanisms 702 for the charging of the on-board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the

10 positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the metallic

15 charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard

20 powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. The said landing platform and deployment system 700 also have a security device 728 such as an anti-theft or anti-tamper notification sensor that alerts the

25 authorized personnel in case its safety is being affected by an unauthorized entity. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this embodiment. The said further improved Remobox station

30 provides a complete power and sensing solution to further enhance the autonomous nature of the unmanned vehicle and its charging mechanism, in which a smart charging mechanism 121, a ground based electrical energy storage and conversion device such as a battery 122, a communication/control module 707, a

fuel cell power system with its own dedicated fuel storage 726, additional battery based backup powering devices or any other relevant powering devices 727, has the interface to accept electrical energy from other sources existing nearby such as a solar farm or a wind farm, or any other renewable or non-renewable power producing devices or power plants, a security device such as anti-theft or anti-tamper notification sensor 728, a security camera 714 with dual functionality of monitoring the surroundings and also provide an additional tool to obtain virtual-line-of-sight feature, an advanced weather station with multiple sensors (including a hyper-local sensing device) 712, a weed/plant killer and insecticide/pesticide killer device 715 to keep the surroundings clear from weed/plant or insecticide/pesticide infestation, a communication device 713 to send/receive signals, and a renewable energy generating device such as solar cells module or photovoltaics cells module to convert ambient/solar light into additional electricity are all integrated into a single box, and makes it ideal for off-grid applications. In order to maintain the security and safety of the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle), a fence 710 with an active deterring mechanism such as electrical shocking can be utilized to keep away animals and humans from tampering or harming the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle).

30

Fig. 18 shows the basic schematic of an unmanned vehicle and the landing platform described in Fig. 17 in its aligned state for charging the on-board energy storage and conversion device via using its on-board charging wirings 731 and 732, its

charging contacts 719 and 720 and the charging mechanisms 734 integrated into the base section 704 of the landing platform 703, where the improved landing platform and deployment system 700 is comprised of a solar cells module 725 integrated into

5 the body of the landing platform and deployment system 700, an unmanned vehicle 716 with on-board charging mechanism (which is comprised of the followings: a charging element such as wire that connects the on-board powering device's positive terminal 732 to the charging contact 719 and a second charging

10 element such as a wire that connects the on-board powering device's negative terminal 731 to the charging contact 720, and having the charging contacts 719 and 720 integrated to the body of the unmanned vehicle for enabling the automatic charging) attached to its body and having rolling elements

15 connected to its landing gear for its easy movement during the self-aligning process, a moveable landing platform with a QR code and a recessed area 709, a processing unit 128, a further improved Remobox station 711 (including its weather station sensors, communication devices, a security device such as a

20 camera, a processing unit, a weed/plant killer integrated with an insecticide/pesticide killer, etc. and other relevant devices needed for the safe operation of the unmanned vehicle and its charging) with additional interfaces to receive electricity from multiple different sources, and a fence 710

25 with an active deterring mechanism. The landing platform and deployment system 700 can have open state and closed states for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the

30 unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing platform with smart landing and alignment mechanisms 703 which has a QR code attached to a recessed landing area 709 is raised to the surface by the movement of the

lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 with a QR code and a recessed area for landing 709 has full airspace for safe deployment of unmanned vehicle 716, the unmanned vehicle 716
5 takes off for its designated mission, then landing platform 703 is retracted back into the landing platform and deployment system 700 and rests on seats for base section 730 in its fully retracted state and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to
10 the landing platform and deployment system 700 for its receiving, self-alignment, charging, and storing activities (also known as closed state for the landing platform and deployment state 700). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a
15 signal to the ground computer or processing unit for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700 (or this processing unit can also be located inside the Remobox power and sensing station 711). The ground processing unit 128 (which is
20 existing either within the landing platform and deployment system 700 or within the Remobox station 711) makes a decision based on the sensor data aggregated from the sensors on-board of the weather station 712 and then sends a "landing is okay" signal or "landing is refused" signal to the unmanned vehicle
25 716 by using the communication/control module 707 or 713. If the signal is sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a recessed landing area 709 with smart landing mechanisms
30 located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code 709 that is located on the landing platform 703 with a

recessed area and uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, the unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned vehicle on the surface of the landing platform 703 and a recessed area is needed in order to prevent the skidding off the unmanned vehicle from the landing platform 703 during abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing platform 703) with the aid of the rolling elements 733 that are attached to the landing gear of the unmanned vehicle 716 until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle towards the central region the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and metallic charging plate 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 and electrical contact between the negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 for the charging of the on-board power module 718 by properly establishing the electrical connection

between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is

5 connected to the positive terminal 123 of the power module 122 and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the metallic charging plates 734 that are attached to an insulator 736 that

10 is adhered to the second alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard powering device 718, it initiates the right switches in order

15 to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this embodiment. The said landing platform and deployment system

20 700 also have a security device 728 such as an anti-theft or anti-tamper notification sensor that alerts the authorized personnel in case its safety is being affected by an unauthorized entity. The said landing platform has a processing unit 128 such a computer to handle the autonomous

25 operations of the unmanned vehicle and also provide a means for an external user to connect to the landing platform and deployment system 700 either physically or remotely. The said landing platform and deployment system 700 has a thermal management device 737 that is either passive or active in

30 order to main the safe operation of the system in different climates of different environmental or weather conditions. The said further improved Remobox station provides a complete power, sensing, and processing solution to further enhance the autonomous nature of the unmanned vehicle and its charging

mechanism, in which a smart charging mechanism 121, a ground based electrical energy storage and conversion device such as a battery 122, a communication/control module 707, a processing unit such as a computer 128, a fuel cell power system with its own dedicated fuel storage 726, additional battery based backup powering devices or any other relevant powering devices 727, has the interface to accept electrical energy from other sources existing nearby such as a solar farm or a wind farm, or any other renewable or non-renewable power producing devices or power plants, a security device such as anti-theft or anti-tamper notification sensor 728, a security camera 714 with dual functionality of monitoring the surroundings and also provides an additional tool to obtain virtual-line-of-sight feature, an advanced weather station with multiple sensors (including a hyper-local sensing device) 712, a weed/plant killer with an integrated insecticide/pesticide killer device 715 to keep the surroundings clear from weed/plant or insecticide/pesticide infestation, a communication device 713 to send/receive signals, and a renewable energy generating device such as solar cells module or photovoltaics cells module to convert ambient/solar light into additional electricity are all integrated into a single box, and makes it ideal for off-grid applications. The said Remobox station also has a thermal management device 737 that is either passive or active in order to make sure the Remobox station is operable under different climate or environmental conditions. In order to maintain the security and safety of the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle), a fence 710 with an active deterring mechanism such as electrical shocking can be utilized to keep away animals and humans from tampering or harming the landing platform and

deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle).

Fig. 19 shows the basic schematic of an unmanned vehicle and
5 it's landing platform and deployment system that is described
in Fig. 18 with their individual processing units (in order to
further improve the autonomous nature of these systems) in its
aligned state for charging the on-board energy storage and
conversion device via using its on-board charging wirings 731
10 and 732, its charging contacts 719 and 720 and the charging
mechanisms 734 integrated into the base section 704 of the
landing platform 703, where the improved landing platform and
deployment system 700 is comprised of a solar cells module 725
integrated into the body of the landing platform and
15 deployment system 700, an unmanned vehicle 716 with on-board
charging mechanism (which is comprised of the followings: a
charging element such as wire that connects the on-board
powering device's positive terminal 732 to the charging
contact 719 and a second charging element such as a wire that
20 connects the on-board powering device's negative terminal 731
to the charging contact 720, and having the charging contacts
719 and 720 integrated to the body of the unmanned vehicle for
enabling the automatic charging) attached to its body and
having rolling elements connected to its landing gear for its
25 easy movement during the self-aligning process, a moveable
landing platform with a QR code and a recessed area 709, a
processing unit 128, a further improved Remobox station 711
(including its weather station sensors, communication devices,
a security device such as a camera, a processing unit, a
30 weed/plant killer integrated with an insecticide/pesticide
killer, etc. and other relevant devices needed for the safe
operation of the unmanned vehicle and its charging) with
additional interfaces to receive electricity from multiple
different sources, and a fence 710 with an active deterring

mechanism. The landing platform and deployment system 700 can have open state and closed states for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting on the landing platform with smart landing and alignment mechanisms 703 which has a QR code attached to a recessed landing area 709 is raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 with a QR code and a recessed area for landing 709 has full airspace for safe deployment of unmanned vehicle 716, the unmanned vehicle 716 takes off for its designated mission, then landing platform 703 is retracted back into the landing platform and deployment system 700 and rests on seats for base section 730 in its fully retracted state and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to the landing platform and deployment system 700 for its receiving, self-alignment, charging, and storing activities (also known as closed state for the landing platform and deployment state 700). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a signal to the ground computer or processing unit for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700 (or this processing unit can also be located inside the Remobox power and sensing station 711). The ground processing unit 128 (which is existing either within the landing platform and deployment system 700 or within the Remobox station 711) makes a decision based on the sensor data aggregated from the sensors on-board of the weather station 712 and then sends a "landing is okay" signal or "landing is refused" signal to the unmanned vehicle 716 by

using the communication/control module 707 or 713. If the signal is sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a
5 recessed landing area 709 with smart landing mechanisms located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code
10 709 that is located on the landing platform 703 with a recessed area and uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, the unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned
15 vehicle on the surface of the landing platform 703 and a recessed area is needed in order to prevent the skidding off the unmanned vehicle from the landing platform 703 during abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment
20 beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing platform 703) with the aid of the rolling elements 733 that are attached to the landing gear of the unmanned vehicle 716
25 until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle towards the central region the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second
30 alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1

(which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and metallic charging plate 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 and electrical contact between the negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 for the charging of the on-board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this embodiment. The said landing platform and deployment system 700 also have a security device 728 such as an anti-theft or anti-tamper notification sensor that alerts the authorized personnel in case its safety is being affected by an unauthorized entity. The said landing platform has a processing unit 128 such a computer to handle the autonomous

operations of the unmanned vehicle and also provide a means for an external user to connect to the landing platform and deployment system 700 either physically or remotely. The said landing platform and deployment system 700 has a thermal management device 737 that is either passive or active in order to main the safe operation of the system in different climates of different environmental or weather conditions. The said further improved Remobox station provides a complete power, sensing, and processing solution to further enhance the autonomous nature of the unmanned vehicle and its charging mechanism, in which a smart charging mechanism 121, a ground based electrical energy storage and conversion device such as a battery 122, a communication/control module 707, a processing unit such as a computer 128, a fuel cell power system with its own dedicated fuel storage 726, additional battery based backup powering devices or any other relevant powering devices 727, has the interface to accept electrical energy from other sources existing nearby such as a solar farm or a wind farm, or any other renewable or non-renewable power producing devices or power plants, a security device such as anti-theft or anti-tamper notification sensor 728, a security camera 714 with dual functionality of monitoring the surroundings and also provides an additional tool to obtain virtual-line-of-sight feature, an advanced weather station with multiple sensors (including a hyper-local sensing device) 712, a weed/plant killer with an integrated insecticide/pesticide killer device 715 to keep the surroundings clear from weed/plant or insecticide/pesticide infestation, a communication device 713 to send/receive signals, and a renewable energy generating device such as solar cells module or photovoltaics cells module to convert ambient/solar light into additional electricity are all integrated into a single box, and makes it ideal for off-grid applications. The said Remobox station also has a thermal

management device 737 that is either passive or active in order to make sure the Remobox station is operable under different climate or environmental conditions. In order to maintain the security and safety of the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle), a fence 710 with an active deterring mechanism such as electrical shocking can be utilized to keep away animals and humans from tampering or harming the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle).

Fig. 20 shows an alternative embodiment of an unmanned vehicle and its landing platform and deployment system that is described in Fig. 19 with their individual processing units (in order to further improve the autonomous nature of these systems) in its aligned state for charging the on-board energy storage and conversion device via using its on-board charging wirings 731 and 732, its charging contacts 719 and 720 and the charging mechanisms 734 integrated into the base section 704 of the landing platform 703, where the improved landing platform and deployment system 700 is comprised of a solar cells module 725 integrated into the body of the landing platform and deployment system 700, an unmanned vehicle 716 with on-board charging mechanism (which is comprised of the followings: a charging element such as wire that connects the on-board powering device's positive terminal 732 to the charging contact 719 and a second charging element such as a wire that connects the on-board powering device's negative terminal 731 to the charging contact 720, and having the charging contacts 719 and 720 integrated to the body of the unmanned vehicle for enabling the automatic charging) attached to its body and having rolling elements connected to its landing gear for its easy movement during the self-

aligning process, a moveable landing platform with a QR code and a recessed area 709, a processing unit 128, a further improved Remobox station 711 (including its weather station sensors, communication devices, a security device such as a camera, a processing unit, a weed/plant killer integrated with an insecticide/pesticide killer, etc. and other relevant devices needed for the safe operation of the unmanned vehicle and its charging) with additional interfaces to receive electricity from multiple different sources, and a fence 710 with an active deterring mechanism. The landing platform and deployment system 700 can have open state and closed states for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing platform with smart landing and alignment mechanisms 703 which has a QR code attached to a recessed landing area 709 is raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 with a QR code and a recessed area for landing 709 has full airspace for safe deployment of unmanned vehicle 716, the unmanned vehicle 716 takes off for its designated mission, then landing platform 703 is retracted back into the landing platform and deployment system 700 and rests on seats for base section 730 in its fully retracted state and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to the landing platform and deployment system 700 for its receiving, self-alignment, charging, and storing activities (also known as closed stated for the landing platform and deployment state 700). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a signal to the ground computer or processing unit for landing

and awaits for a confirmation from the processing unit of the landing platform and deployment system 700 (or this processing unit can also be located inside the Remobox power and sensing station 711). The ground processing unit 128 (which is
5 existing either within the landing platform and deployment system 700 or within the Remobox station 711) makes a decision based on the sensor data aggregated from the sensors on-board of the weather station 712 and then sends a "landing is okay" signal or "landing is refused" signal to the unmanned vehicle
10 716 by using the communication/control module 707 or 713. If the signal is sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a recessed landing area 709 with smart landing mechanisms
15 located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code 709 that is located on the landing platform 703 with a
20 recessed area and uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, the unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned vehicle on the surface of the landing platform 703 and a
25 recessed area is needed in order to prevent the skidding off the unmanned vehicle from the landing platform 703 during abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment beams/mechanism 701a moves towards each other in order to
30 adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing platform 703) with the aid of the rolling elements 733 that are attached to the landing gear of the unmanned vehicle 716 until both doors 701 makes full contact with the unmanned

vehicle and push the unmanned vehicle towards the central region the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second
5 alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1
10 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and metallic charging plate 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 and electrical contact between the negative terminal charging contact #2 (which is labeled
15 720) attached to the landing mechanism of the unmanned vehicle 716 and the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 for the charging of the on-board power module 718 by properly establishing the electrical connection
20 between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122
25 and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702. Once
30 the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard powering device 718, it initiates the right switches in order to initiate the charging process and then completes the

charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this embodiment. The said landing platform and deployment system 5 700 also have a security device 728 such as an anti-theft or anti-tamper notification sensor that alerts the authorized personnel in case its safety is being affected by an unauthorized entity. The said landing platform has a processing unit 128 such a computer to handle the autonomous 10 operations of the unmanned vehicle and also provide a means for an external user to connect to the landing platform and deployment system 700 either physically or remotely. The said landing platform and deployment system 700 has a thermal management device 737 that is either passive or active in 15 order to main the safe operation of the system in different climates of different environmental or weather conditions. The said further improved Remobox station provides a complete power, sensing, and processing solution to further enhance the autonomous nature of the unmanned vehicle and its charging 20 mechanism, in which a smart charging mechanism 121, a ground based electrical energy storage and conversion device such as a battery 122, a communication/control module 707, a processing unit such as a computer 128, a fuel cell power system with its own dedicated fuel storage 726, additional 25 battery based backup powering devices or any other relevant powering devices 727, has the interface to accept electrical energy from other sources existing nearby such as a solar farm or a wind farm, or any other renewable or non-renewable power producing devices or power plants, a security device such as 30 anti-theft or anti-tamper notification sensor 728, a security camera 714 with dual functionality of monitoring the surroundings and also provides an additional tool to obtain virtual-line-of-sight feature, an advanced weather station with multiple sensors (including a hyper-local sensing device)

712, a weed/plant killer with an integrated insecticide/pesticide killer device 715 to keep the surroundings clear from weed/plant or insecticide/pesticide infestation, a communication device 713 to send/receive signals, and a renewable energy generating device such as solar cells module or photovoltaics cells module to convert ambient/solar light into additional electricity are all integrated into a single box, and makes it ideal for off-grid applications. The said Remobox station also has a thermal management device 737 that is either passive or active in order to make sure the Remobox station is operable under different climate or environmental conditions. In order to maintain the security and safety of the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle), a fence 710 with an active deterring mechanism such as electrical shocking can be utilized to keep away animals and humans from tampering or harming the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle). In this embodiment, the solar cell module(s) have the capability of staying planar or moving along certain axis in order to keep the surface the solar cells clean, orient the solar cells in a direction to further improve the solar energy conversion efficiency, etc. Furthermore, the exterior look of the landing and deployment system, unmanned vehicle, and Remobox is designed to have a camouflaged texture for defense applications using the appropriate color/texture/markings that have been specified by authorities of that particular agency such as green colored exterior or camo textured colored exterior, etc.

Fig. 21 shows an alternative embodiment of an unmanned vehicle and it's landing platform and deployment system that is

described in Fig. 19 with their individual processing units (in order to further improve the autonomous nature of these systems) in its aligned state for charging the on-board energy storage and conversion device via using its on-board charging wirings 731 and 732, its charging contacts 719 and 720 and the charging mechanisms 734 integrated into the base section 704 of the landing platform 703, where the improved landing platform and deployment system 700 is comprised of a solar cells module 725 integrated into the body of the landing platform and deployment system 700, an unmanned vehicle 716 with on-board charging mechanism (which is comprised of the followings: a charging element such as wire that connects the on-board powering device's positive terminal 732 to the charging contact 719 and a second charging element such as a wire that connects the on-board powering device's negative terminal 731 to the charging contact 720, and having the charging contacts 719 and 720 integrated to the body of the unmanned vehicle for enabling the automatic charging) attached to its body and having rolling elements connected to its landing gear for its easy movement during the self-aligning process, a moveable landing platform with a QR code and a recessed area 709, a processing unit 128, a further improved Remobox station 711 (including its weather station sensors, communication devices, a security device such as a camera, a processing unit, a weed/plant killer integrated with an insecticide/pesticide killer, etc. and other relevant devices needed for the safe operation of the unmanned vehicle and its charging) with additional interfaces to receive electricity from multiple different sources, and a fence 710 with an active deterring mechanism. The landing platform and deployment system 700 can have open state and closed states for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the

unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing platform with smart landing and alignment mechanisms 703 which has a QR code attached to a recessed landing area 709 is

5 raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 with a QR code and a recessed area for landing 709 has full airspace for safe deployment of unmanned vehicle 716, the unmanned vehicle 716

10 takes off for its designated mission, then landing platform 703 is retracted back into the landing platform and deployment system 700 and rests on seats for base section 730 in its fully retracted state and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to

15 the landing platform and deployment system 700 for its receiving, self-alignment, charging, and storing activities (also known as closed stated for the landing platform and deployment state 700). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a

20 signal to the ground computer or processing unit for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700 (or this processing unit can also be located inside the Remobox power and sensing station 711). The ground processing unit 128 (which is

25 existing either within the landing platform and deployment system 700 or within the Remobox station 711) makes a decision based on the sensor data aggregated from the sensors on-board of the weather station 712 and then sends a "landing is okay" signal or "landing is refused" signal to the unmanned vehicle

30 716 by using the communication/control module 707 or 713. If the signal is sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a recessed landing area 709 with smart landing mechanisms

located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code 709 that is located on the landing platform 703 with a recessed area and uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, the unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned vehicle on the surface of the landing platform 703 and a recessed area is needed in order to prevent the skidding off the unmanned vehicle from the landing platform 703 during abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing platform 703) with the aid of the rolling elements 733 that are attached to the landing gear of the unmanned vehicle 716 until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle towards the central region the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and metallic charging plate 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 and electrical contact between the negative terminal charging contact #2 (which is labeled

720) attached to the landing mechanism of the unmanned vehicle 716 and the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 for the charging of the on-board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this embodiment. The said landing platform and deployment system 700 also have a security device 728 such as an anti-theft or anti-tamper notification sensor that alerts the authorized personnel in case its safety is being affected by an unauthorized entity. The said landing platform has a processing unit 128 such a computer to handle the autonomous operations of the unmanned vehicle and also provide a means for an external user to connect to the landing platform and deployment system 700 either physically or remotely. The said landing platform and deployment system 700 has a thermal management device 737 that is either passive or active in

order to main the safe operation of the system in different climates of different environmental or weather conditions. The said further improved Remobox station provides a complete power, sensing, and processing solution to further enhance the autonomous nature of the unmanned vehicle and its charging mechanism, in which a smart charging mechanism 121, a ground based electrical energy storage and conversion device such as a battery 122, a communication/control module 707, a processing unit such as a computer 128, a fuel cell power system with its own dedicated fuel storage 726, additional battery based backup powering devices or any other relevant powering devices 727, has the interface to accept electrical energy from other sources existing nearby such as a solar farm or a wind farm, or any other renewable or non-renewable power producing devices or power plants, a security device such as anti-theft or anti-tamper notification sensor 728, a security camera 714 with dual functionality of monitoring the surroundings and also provides an additional tool to obtain virtual-line-of-sight feature, an advanced weather station with multiple sensors (including a hyper-local sensing device) 712, a weed/plant killer with an integrated insecticide/pesticide killer device 715 to keep the surroundings clear from weed/plant or insecticide/pesticide infestation, a communication device 713 to send/receive signals, and a renewable energy generating device such as solar cells module or photovoltaics cells module to convert ambient/solar light into additional electricity are all integrated into a single box, and makes it ideal for off-grid applications. The said Remobox station also has a thermal management device 737 that is either passive or active in order to make sure the Remobox station is operable under different climate or environmental conditions. In order to maintain the security and safety of the landing platform and deployment system 700 (including all of the other peripherals

associated with the operation of the unmanned vehicle), a fence 710 with an active deterring mechanism such as electrical shocking can be utilized to keep away animals and humans from tampering or harming the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle). In this embodiment, the solar cell module(s) have the capability of staying planar or moving along certain axis in order to keep the surface the solar cells clean, orient the solar cells in a direction to further improve the solar energy conversion efficiency, etc. Furthermore, the exterior look of the landing and deployment system, unmanned vehicle, and Remobox is designed to have the theme of a smart city concept using the appropriate color/texture/markings selected by that particular city authorities/community members such as white-to-gray background color with gray text color and blue partial-text coloring for Singapore, etc.,

Fig. 22 shows an alternative embodiment of an unmanned vehicle and it's landing platform and deployment system that is described in Fig. 19 with their individual processing units (in order to further improve the autonomous nature of these systems) in its aligned state for charging the on-board energy storage and conversion device via using its on-board charging wirings 731 and 732, its charging contacts 719 and 720 and the charging mechanisms 734 integrated into the base section 704 of the landing platform 703, where the improved landing platform and deployment system 700 is comprised of a solar cells module 725 integrated into the body of the landing platform and deployment system 700, an unmanned vehicle 716 with on-board charging mechanism (which is comprised of the followings: a charging element such as wire that connects the on-board powering device's positive terminal 732 to the charging contact 719 and a second charging element such as a

wire that connects the on-board powering device's negative terminal 731 to the charging contact 720, and having the charging contacts 719 and 720 integrated to the body of the unmanned vehicle for enabling the automatic charging)

5 attached to its body and having rolling elements connected to its landing gear for its easy movement during the self-aligning process, a moveable landing platform with a QR code and a recessed area 709, a processing unit 128, a further improved Remobox station 711 (including its weather station

10 sensors, communication devices, a security device such as a camera, a processing unit, a weed/plant killer integrated with an insecticide/pesticide killer, etc. and other relevant devices needed for the safe operation of the unmanned vehicle and its charging) with additional interfaces to receive

15 electricity from multiple different sources, and a fence 710 with an active deterring mechanism. The landing platform and deployment system 700 can have open state and closed states for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing,

20 self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing platform with smart landing and alignment mechanisms 703 which has a QR code attached to a recessed landing area 709 is

25 raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 with a QR code and a recessed area for landing 709 has full airspace for safe deployment of unmanned vehicle 716, the unmanned vehicle 716

30 takes off for its designated mission, then landing platform 703 is retracted back into the landing platform and deployment system 700 and rests on seats for base section 730 in its fully retracted state and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to

the landing platform and deployment system 700 for its receiving, self-alignment, charging, and storing activities (also known as closed state for the landing platform and deployment state 700). As the unmanned vehicle 716 approaches
5 the landing platform and deployment system 700, it sends a signal to the ground computer or processing unit for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700 (or this processing unit can also be located inside the Remobox power and sensing
10 station 711). The ground processing unit 128 (which is existing either within the landing platform and deployment system 700 or within the Remobox station 711) makes a decision based on the sensor data aggregated from the sensors on-board of the weather station 712 and then sends a "landing is okay"
15 signal or "landing is refused" signal to the unmanned vehicle 716 by using the communication/control module 707 or 713. If the signal is sent is landing is OK, then the unmanned vehicle continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a
20 recessed landing area 709 with smart landing mechanisms located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code
25 709 that is located on the landing platform 703 with a recessed area and uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, the unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned
30 vehicle on the surface of the landing platform 703 and a recessed area is needed in order to prevent the skidding off the unmanned vehicle from the landing platform 703 during abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment

beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing platform 703) with the aid of the rolling elements 733 that
5 are attached to the landing gear of the unmanned vehicle 716 until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle towards the central region the landing platform 703 and then a signal is sent or the doors are stopped with a switch in order to prevent
10 crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of the unmanned vehicle 716 in order to establish the electrical
15 contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and metallic charging plate 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 and electrical contact between
20 the negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 for the charging of the on-board power
25 module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is
30 connected to the positive terminal 123 of the power module 122 and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the metallic charging plates 734 that are attached to an insulator 736 that

is adhered to the second alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard

5 powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this

10 embodiment. The said landing platform and deployment system 700 also have a security device 728 such as an anti-theft or anti-tamper notification sensor that alerts the authorized personnel in case its safety is being affected by an unauthorized entity. The said landing platform has a

15 processing unit 128 such a computer to handle the autonomous operations of the unmanned vehicle and also provide a means for an external user to connect to the landing platform and deployment system 700 either physically or remotely. The said landing platform and deployment system 700 has a thermal

20 management device 737 that is either passive or active in order to main the safe operation of the system in different climates of different environmental or weather conditions. The said further improved Remobox station provides a complete power, sensing, and processing solution to further enhance the

25 autonomous nature of the unmanned vehicle and its charging mechanism, in which a smart charging mechanism 121, a ground based electrical energy storage and conversion device such as a battery 122, a communication/control module 707, a processing unit such as a computer 128, a fuel cell power

30 system with its own dedicated fuel storage 726, additional battery based backup powering devices or any other relevant powering devices 727, has the interface to accept electrical energy from other sources existing nearby such as a solar farm or a wind farm, or any other renewable or non-renewable power

producing devices or power plants, a security device such as anti-theft or anti-tamper notification sensor 728, a security camera 714 with dual functionality of monitoring the surroundings and also provides an additional tool to obtain

5 virtual-line-of-sight feature, an advanced weather station with multiple sensors (including a hyper-local sensing device) 712, a weed/plant killer with an integrated insecticide/pesticide killer device 715 to keep the surroundings clear from weed/plant or insecticide/pesticide

10 infestation, a communication device 713 to send/receive signals, and a renewable energy generating device such as solar cells module or photovoltaics cells module to convert ambient/solar light into additional electricity are all integrated into a single box, and makes it ideal for off-grid

15 applications. The said Remobox station also has a thermal management device 737 that is either passive or active in order to make sure the Remobox station is operable under different climate or environmental conditions. In order to maintain the security and safety of the landing platform and

20 deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle), a fence 710 with an active deterring mechanism such as electrical shocking can be utilized to keep away animals and humans from tampering or harming the landing platform and

25 deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle). In this embodiment, the solar cell module(s) have the capability of staying planar or moving along certain axis in order to keep the surface the solar cells clean, orient the solar cells

30 in a direction to further improve the solar energy conversion efficiency, etc. Furthermore, the exterior look of the landing and deployment system, unmanned vehicle, and Remobox is designed to have the theme relevant to a construction-site concept (that has been selected by the representing

authorities of that particular agency or entity) using the appropriate color/texture/markings such as orange or yellow background color with properly angled black and orange or yellow stripes, etc.

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Fig. 23 shows an alternative embodiment of an unmanned vehicle and its landing platform and deployment system that is described in Fig. 19 with their individual processing units (in order to further improve the autonomous nature of these systems) in its aligned state for charging the on-board energy storage and conversion device via using its on-board charging wirings 731 and 732, its charging contacts 719 and 720 and the charging mechanisms 734 integrated into the base section 704 of the landing platform 703, where the improved landing platform and deployment system 700 is comprised of a solar cells module 725 integrated into the body of the landing platform and deployment system 700, an unmanned vehicle 716 with on-board charging mechanism (which is comprised of the followings: a charging element such as wire that connects the on-board powering device's positive terminal 732 to the charging contact 719 and a second charging element such as a wire that connects the on-board powering device's negative terminal 731 to the charging contact 720, and having the charging contacts 719 and 720 integrated to the body of the unmanned vehicle for enabling the automatic charging) attached to its body and having rolling elements connected to its landing gear for its easy movement during the self-aligning process, a moveable landing platform with a QR code and a recessed area 709, a processing unit 128, a further improved Remobox station 711 (including its weather station sensors, communication devices, a security device such as a camera, a processing unit, a weed/plant killer integrated with an insecticide/pesticide killer, etc. and other relevant devices needed for the safe operation of the unmanned vehicle

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and its charging) with additional interfaces to receive electricity from multiple different sources, and a fence 710 with an active deterring mechanism. The landing platform and deployment system 700 can have open state and closed states
5 for its operations. The open state enables the deployment of the unmanned vehicle and the closed state enables the storing, self-alignment, and charging of the unmanned vehicle after the unmanned vehicle is received from a mission. In the open state, the unmanned vehicle 716 resting the on the landing
10 platform with smart landing and alignment mechanisms 703 which has a QR code attached to a recessed landing area 709 is raised to the surface by the movement of the lifting/descending mechanisms 705 after the main doors 701 are opened. Once the landing platform 703 with a QR code and a
15 recessed area for landing 709 has full airspace for safe deployment of unmanned vehicle 716, the unmanned vehicle 716 takes off for its designated mission, then landing platform 703 is retracted back into the landing platform and deployment system 700 and rests on seats for base section 730 in its
20 fully retracted state and then the doors 701 are closed. After the completion of the mission, the unmanned vehicle returns to the landing platform and deployment system 700 for its receiving, self-alignment, charging, and storing activities (also known as closed stated for the landing platform and
25 deployment state 700). As the unmanned vehicle 716 approaches the landing platform and deployment system 700, it sends a signal to the ground computer or processing unit for landing and awaits for a confirmation from the processing unit of the landing platform and deployment system 700 (or this processing
30 unit can also be located inside the Remobox power and sensing station 711). The ground processing unit 128 (which is existing either within the landing platform and deployment system 700 or within the Remobox station 711) makes a decision based on the sensor data aggregated from the sensors on-board

of the weather station 712 and then sends a "landing is okay" signal or "landing is refused" signal to the unmanned vehicle 716 by using the communication/control module 707 or 713. If the signal is sent is landing is OK, then the unmanned vehicle

5 continues its approach for landing, then the doors 701 are opened, and then the landing platform with a QR code and a recessed landing area 709 with smart landing mechanisms located on the base section 704 is raised with the movement of lifting/descending mechanisms that utilizes a motor and

10 transmission system for its movement, then the unmanned vehicle that is equipped with a camera 724 detects the QR code 709 that is located on the landing platform 703 with a recessed area and uses this QR code for the precision landing of the unmanned vehicle 716 onto the landing platform 703, the

15 unmanned vehicle utilizes its rolling elements that are attached to the landing gear for easy movement of the unmanned vehicle on the surface of the landing platform 703 and a recessed area is needed in order to prevent the skidding off the unmanned vehicle from the landing platform 703 during

20 abnormal weather conditions, after the completion of the landing process the doors 701 with first alignment beams/mechanism 701a moves towards each other in order to adjust the alignment of the unmanned vehicle 716 toward the predetermined charging region (which is also known as landing

25 platform 703) with the aid of the rolling elements 733 that are attached to the landing gear of the unmanned vehicle 716 until both doors 701 makes full contact with the unmanned vehicle and push the unmanned vehicle towards the central region the landing platform 703 and then a signal is sent or

30 the doors are stopped with a switch in order to prevent crushing damages to the unmanned vehicle 716, then second alignment beams/mechanisms 702 start to move towards each other (which are orthogonal to the first alignment beams/mechanisms 701a) and further align the orientation of

the unmanned vehicle 716 in order to establish the electrical contact between the positive terminal charging contact #1 (which is labeled 719) attached to the landing mechanism of the unmanned vehicle 716 and metallic charging plate 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 and electrical contact between the negative terminal charging contact #2 (which is labeled 720) attached to the landing mechanism of the unmanned vehicle 716 and the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702 for the charging of the on-board power module 718 by properly establishing the electrical connection between the power module 122 and the on-board power module 718 via using a switchable rectifier (also known as polarity switch) 121. For the proper charging it is essential that the positive pole 722 of the on-board power module 718 is connected to the positive terminal 123 of the power module 122 and negative pole 721 of the on-board power module 718 is connected to the negative terminal 124 of the power module 122 via electrical contact that is established by the metallic charging plates 734 that are attached to an insulator 736 that is adhered to the second alignment beams/mechanisms 702. Once the electrical connection is established between the on-board powering device 718 and the power module 122, the improved charging mechanism detects the polarity of the onboard powering device 718, it initiates the right switches in order to initiate the charging process and then completes the charging process. All of the essential polarity states are provided in the abovementioned examples that are provided in the previous examples/embodiments can also be used for this embodiment. The said landing platform and deployment system 700 also have a security device 728 such as an anti-theft or anti-tamper notification sensor that alerts the authorized personnel in case its safety is being affected by an

unauthorized entity. The said landing platform has a processing unit 128 such a computer to handle the autonomous operations of the unmanned vehicle and also provide a means for an external user to connect to the landing platform and deployment system 700 either physically or remotely. The said landing platform and deployment system 700 has a thermal management device 737 that is either passive or active in order to main the safe operation of the system in different climates of different environmental or weather conditions.

10 The said further improved Remobox station provides a complete power, sensing, and processing solution to further enhance the autonomous nature of the unmanned vehicle and its charging mechanism, in which a smart charging mechanism 121, a ground based electrical energy storage and conversion device such as

15 a battery 122, a communication/control module 707, a processing unit such as a computer 128, a fuel cell power system with its own dedicated fuel storage 726, additional battery based backup powering devices or any other relevant powering devices 727, has the interface to accept electrical

20 energy from other sources existing nearby such as a solar farm or a wind farm, or any other renewable or non-renewable power producing devices or power plants, a security device such as anti-theft or anti-tamper notification sensor 728, a security camera 714 with dual functionality of monitoring the

25 surroundings and also provides an additional tool to obtain virtual-line-of-sight feature, an advanced weather station with multiple sensors (including a hyper-local sensing device) 712, a weed/plant killer with an integrated insecticide/pesticide killer device 715 to keep the

30 surroundings clear from weed/plant or insecticide/pesticide infestation, a communication device 713 to send/receive signals, and a renewable energy generating device such as solar cells module or photovoltaics cells module to convert ambient/solar light into additional electricity are all

integrated into a single box, and makes it ideal for off-grid applications. The said Remobox station also has a thermal management device 737 that is either passive or active in order to make sure the Remobox station is operable under
5 different climate or environmental conditions. In order to maintain the security and safety of the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle), a fence 710 with an active deterring mechanism such as
10 electrical shocking can be utilized to keep away animals and humans from tampering or harming the landing platform and deployment system 700 (including all of the other peripherals associated with the operation of the unmanned vehicle). In this embodiment, the solar cell module(s) have the capability
15 of staying planar or moving along certain axis in order to keep the surface the solar cells clean, orient the solar cells in a direction to further improve the solar energy conversion efficiency, etc. Furthermore, the exterior look of the landing and deployment system, unmanned vehicle, and Remobox
20 is designed to have the theme relevant to a certain locality (that has been selected by the representing authorities of that particular locality) using the appropriate color/texture/markings such as having sand colored exterior for desert areas such as a locality in Africa or forestry
25 colored exterior for particular city in the vicinity of jungles, etc.

Although the above description contains much specificity, this
30 should not be construed as limiting the scope of the embodiments but merely providing illustration of the foreseeable embodiments. The above-stated advantages of the embodiments should not be construed especially as limiting the scope of the embodiments but merely to explain possible

achievements if the described embodiments are put into practice. Thus, the scope of the embodiments should be determined by the claims and their equivalents, rather than by the examples given.

REFERENCE NUMBERS

	1	unmanned vehicle charging system
	1b	unmanned vehicle charging system
5	2	unmanned vehicle landing platform and deployment system
	3	unmanned vehicle landing platform and deployment system
	3a	unmanned vehicle landing platform and deployment system
10	5	unmanned vehicle landing platform and deployment system
	31	unmanned vehicle's integrated weather station and power module
	90	landing platform
15	100	landing pad
	101	unmanned vehicle
	102	positive electrode
	103	negative electrode
	104	beacon unit
20	111	charging contact surface or charging plate or charging element
	112	charging contact surface or charging plate or charging element
25	121	polarity switch (also known as switchable rectifier)
	122	power module or an energy storage and conversion device or battery
	123	positive pole
	124	negative pole
30	128	processing unit
	198	unmanned vehicle positional alignment unit
	201	first longitudinal adjustment beam
	202	second longitudinal adjustment beam
	203	lateral directions

	211	first lateral adjustment beam
	212	second lateral adjustment beam
	213	longitudinal directions
	221	motor
5	240	presence sensor
	250	presence sensor
	311	anemometer
	312	temperature sensor
	313	weather vane
10	314	camera
	315	network unit
	321	enclosure box
	400	unmanned vehicle storage box
	410	landing platform
15	430	unmanned vehicle hangar module
	440	unmanned vehicle container
	441	landing deck
	442	side panel
	445	side panel
20	450	unmanned vehicle landing-cum-storage tray
	470	unmanned vehicle landing platform
	490	unmanned vehicle landing platform extension mechanism
	601	cover
25	601a	cover
	603	movable cover portion
	607	fixed cover portion
	700	Unmanned vehicle deployment, landing, storage, and charging base
30	701	Opening doors for the unmanned vehicle deployment, landing, storage, and charging base
	701a	First alignment beams/mechanism to align the unmanned vehicle after its landing onto the landing pad

- 702 Second alignment beams/mechanism to align the
unmanned vehicle after its landing onto the
landing pad and also the charging connections
- 5 703 Landing platform with smart landing and
alignment mechanisms for the unmanned vehicle
- 704 Base section of the landing with smart landing
and alignment mechanisms for the unmanned
vehicle
- 10 705 Lifting/descending mechanism to move up or down
the base section of the landing with smart
landing and alignment mechanisms for the
unmanned vehicle and the landing platform with
smart landing and alignment mechanisms for the
unmanned vehicle
- 15 706 Weather station with weather sensors
707 Communication/control module
708 QR code marked landing platform with smart
landing and alignment mechanisms for the
unmanned vehicle
- 20 709 QR code marked landing platform that has a
recess with smart landing and alignment
mechanisms for the unmanned vehicle
- 710 Fence with an active deterrent mechanism such
as electric fence
- 25 711 Remobox station containing the power module,
switchable rectifier, communication/control
module, and weather station module
- 712 An advanced weather station module that is
comprised of single or multiple sensors (such
30 as wind direction, wind speed, hyper-local
weather sensors, temperature, rain, pressure,
etc.)
- 713 Communication device such as antenna,
Bluetooth, GSM, wireless router, etc.

- 714 Security device such as a camera (optical,
thermal, LIDAR, etc.)
- 715 Weed-killer spray, plant-killer,
pesticide/insecticide, etc. control device
- 5 716 Unmanned vehicle with charging mechanism
integrated into the body of the unmanned
vehicle
- 717 Landing mechanism for the unmanned vehicle
- 718 Energy storage and power generation module for
the unmanned vehicle
- 10 719 Positive terminal charging contact #1 attached
to the landing mechanism of the unmanned
vehicle
- 720 Negative terminal charging contact #2 attached
to the landing mechanism of the unmanned
vehicle
- 15 721 Negative terminal of the energy storage and
power generation module for the unmanned
vehicle
- 20 722 Positive terminal of the energy storage and
power generation module for the unmanned
vehicle
- 723 Payload for the unmanned vehicle such as a
sensing device or any other general payload
devices required for the mission
- 25 724 Payload for the unmanned vehicle such as a
sensing device such as a camera (optical,
thermal, LIDAR, etc.)
- 725 Renewable energy source based power such as
solar power module or photovoltaics power
module
- 30 726 Fuel cell based power module with its fuel
storage medium
- 727 Battery or other relevant power sources

- 728 Security device such as anti-theft, anti-
tamper, etc. to monitor the security and
whereabouts, etc. of the module
- 5 729 Renewable energy source based power such as
wind power, etc.
- 730 Seat for base section of the landing with smart
landing and alignment mechanisms for the
unmanned vehicle
- 10 731 Negative terminal charging wire that connects
the on-board energy storage and energy-
producing device to the charging mechanism
located on the landing gear of the unmanned
vehicle
- 15 732 Positive terminal charging wire that connects
the on-board energy storage and energy-
producing device to the charging mechanism
located on the landing gear of the unmanned
vehicle
- 20 733 Rolling element that permits the alignment of
the unmanned vehicle on the landing platform
- 734 Metallic charging plate that transfer the
electrical energy from the power module to the
on-board energy storage and energy producing
device located on the unmanned vehicle
- 25 735 Capturing block to contain the rolling element
that permits the alignment of the unmanned
vehicle on the landing platform
- 736 Insulation plate that electrically isolates the
metallic charging plate from the second
30 alignment beams/mechanism
- 737 Passive or active thermal management device

CLAIMS

1. An unmanned vehicle module comprising
an unmanned vehicle that comprises a first unmanned
5 vehicle (battery) electrode and a second unmanned vehicle
(battery) electrode, and
a landing platform that comprises
- a landing area for receiving the (landing)
unmanned vehicle, wherein the landing area comprises
10 a predetermined charging region,
 - an (elongated) first charging plate,
 - an (elongated) second charging plate,
wherein the first charging plate and the second
charging plate are arranged (positioned) in the
15 predetermined charging region,
 - an electrical energy storage device for
connecting electrically with the first charging
plate and with the second charging plate, and
 - an unmanned vehicle alignment mechanism (for
20 enclosing the landing area and) for moving the
(landed) unmanned vehicle (towards and) into the
predetermined charging region,
wherein the first unmanned vehicle electrode
electrically connects with the first charging plate
25 and the second unmanned vehicle electrode
electrically connects with the second charging
plate,
wherein the unmanned vehicle alignment mechanism
comprises
- 30 - a (movable) first beam,
 - a (movable) second beam,
 - a (movable) third beam,
 - a (movable) fourth beam, and

- an actuation device for actuating at least two of the first beam, the second beam, the third beam, and the fourth beam to push the unmanned vehicle into the charging region.

5

2. An unmanned vehicle module comprising a landing platform that comprises

- a landing area for receiving an (landing) unmanned vehicle, wherein the landing area comprises a predetermined charging region,
 - an (elongated) first charging plate,
 - an (elongated) second charging plate,
- wherein the first charging plate and the second charging plate are arranged (positioned) in the predetermined charging region,
- an electrical energy storage device for connecting electrically with the first charging plate and with the second charging plate, and
 - an unmanned vehicle alignment mechanism (for enclosing the landing area and) for moving the (landed) unmanned vehicle (towards and) into the predetermined charging region,
- wherein a first unmanned vehicle electrode of the unmanned vehicle electrically connects with the first charging plate and a second unmanned vehicle electrode of the unmanned vehicle electrically connects with the second charging plate,
- wherein the unmanned vehicle alignment mechanism comprises
- a (movable) first beam,
 - a (movable) second beam,
 - a (movable) third beam,
 - a (movable) fourth beam, and

- an actuation device for actuating at least two of the first beam, the second beam, the third beam, and the fourth beam to push the unmanned vehicle into the charging region.

5

3. The unmanned vehicle module according to claim 1 or 2, wherein the (elongated) first charging plate and the (elongated) second charging plate are arranged essentially parallel to each other.
- 10
4. The unmanned vehicle module according to one of claims 1 to 3, wherein the first beam is arranged (positioned) substantially parallel to the second beam.
- 15
5. The unmanned vehicle module according to claim 4, wherein the third beam is arranged (positioned) substantially parallel to the fourth beam.
- 20
6. The unmanned vehicle module according to claim 5, wherein the third beam is arranged (positioned) substantially perpendicular to the first beam.
- 25
7. The unmanned vehicle module according to one of claims 1 further comprising a polarity switch for selectively connecting electrically the first charging plate with one of two terminals of the electrical energy storage device and for connecting electrically the second charging plate with the other one of the two terminals of the electrical energy storage device.
- 30
8. The unmanned vehicle module according to one of the preceding claims, wherein the first charging plate and

the second charging plate comprises essentially non-magnetic electrically conductive material.

- 5 9. The unmanned vehicle module according to claim 8, wherein the essentially non-magnetic electrically conductive material comprises austenitic stainless steel.
- 10 10. The unmanned vehicle module according to one of the preceding claims, the landing platform further comprising a movable cover for covering the landing area (and/or the (landed) unmanned vehicle).
- 15 11. The unmanned vehicle module according to claim 10, wherein the movable cover comprises electrically insulating material (that allows radio waves to pass through with low attenuation).
- 20 12. The unmanned vehicle module according to claim 11, wherein the electrically insulating material comprises canvas.
- 25 13. A storage unit for enclosing at least one unmanned vehicle, the storage unit comprising
a container for enclosing the at least one unmanned vehicle,
a first unmanned vehicle module according to one of claims 10 to 12 for receiving the at least one unmanned vehicle and for covering the received unmanned vehicle,
at least one second unmanned vehicle module
30 according to one of claims 1 to 9 for receiving the at least one unmanned vehicle, the at least one second unmanned vehicle module being movable into and outside the container,

- wherein the at least one second unmanned vehicle module is adapted to be stacked vertically, the first unmanned vehicle module is adapted to be vertically stacked on top of the at least one second unmanned vehicle module,
- 5 a camera for receiving a beacon unit light signal from the unmanned vehicle, and
- an unmanned vehicle controller for selecting one unmanned vehicle module from a group consisting of the first unmanned vehicle module and the at least one second
- 10 unmanned vehicle module, and for generating a unmanned vehicle flight instruction for landing the unmanned vehicle on the selected unmanned vehicle module according to light signal data from the camera and for sending out the unmanned vehicle flight instruction to the unmanned
- 15 vehicle.
14. The storage unit according to claim 13 further comprising a mechanism for moving the at least one second unmanned vehicle module (into and outside of the container).
- 20
15. The storage unit according to one of claim 13 to 14 further comprising a wind speed sensor (anemometer), wherein
- the controller module is further adapted for generating
- 25 the unmanned vehicle flight instruction according to wind speed data from the wind speed sensor (anemometer).
16. The storage unit according to one of claims 13 to 15 further comprising
- 30 a wind direction sensor (weather vane), wherein
- the controller module is further adapted for generating the unmanned vehicle flight instruction according to wind direction data from the wind direction sensor (weather vane).

17. The storage unit according to one of claims 13 to 16
further comprising
a wireless communication unit for sending out the
5 unmanned vehicle flight instruction.

18. An unmanned vehicle module's landing and deployment
system comprising of
a landing and deployment system
10 -where the landing and deployment platform is
comprised of opening/closing doors to align the
landed unmanned vehicle to a pre-determined landing
region by using the doors or structures attached to
the doors (where the doors are parallel to each other
15 and have the capability of approaching or moving away
from each other), a first and second alignment
mechanisms (which is orthogonal to the
opening/closing doors) that is located on a moveable
base section (where the base section can move
20 vertically or horizontally depending on the need) for
further alignment of the unmanned vehicle to the pre-
determined landing region (where the first and second
alignment beams/structures are parallel to each other
and have the capability of approaching or moving away
25 from each other) and also electrically connecting the
unmanned vehicle's on-board charging mechanism to the
power module for charging of the on-board powering
device of unmanned vehicle, having the landing
platform and deployment system aiding in the
30 following functions: deployment of the unmanned
vehicle, receiving and landing of the unmanned
vehicle, storage of the unmanned vehicle, charging of
the unmanned vehicle, and other essential
functionalities that are needed for the operation of

the unmanned vehicle and the associated peripherals,
motors, switches, linear transmission mechanisms,
sensors, guiding rails, and other essential
peripherals needed to open/close doors, move the
5 first and second alignment mechanisms,
lifting/descending the landing platform, etc.
functions,
a smart charging mechanism,
-where there exists multiple charging mechanisms
10 such as one of the charging mechanism being located
on the landing platform and deployment system and the
second one being located on-board of the unmanned
vehicle, where the first charging mechanism allows
the electrical contact to be made between the power
15 module and the charging elements integrated into the
body of the unmanned vehicle via metallic contacts of
the first/second alignment mechanisms, and the second
charging mechanism that is located on-board of the
unmanned vehicle that enables the electrical
20 connection be made between the on-board powering
device and the charging mechanism located on the
landing platform and deployment system, furthermore
the charging mechanisms are connected to a power
module with polarity switches in order to safely
25 charge unmanned vehicle's the on-board powering
device and also prevent the electrical shorting of
the unmanned vehicle's the on-board powering device
and power module, the charging mechanism have
multiple states of charging depending on the
30 orientation of the unmanned vehicle after its landing
where it can automatically sense the polarity of the
unmanned vehicle's battery terminals or the voltage
and then open or close the appreciate switches of the
polarity switch in order to initiate the proper

charging without creating any electrical shorts,
completes the charging and then stops the charging
process,

a power module

- 5 -where the power module is a device that can provide
electrical energy to the unmanned vehicle's on-board
powering device via polarity switch and charging
mechanisms installed on the landing platform and
deployment system and on the unmanned vehicle and
10 can be a stand alone device or a hybrid combination
of the followings such an electric power supply that
is connected to the grid and where the electricity
is obtained from fossil fuel power plants,
hydroelectric power plants, solar thermal power
15 plants, nuclear power plants, geothermal power
plants, wind power towers and etc., batteries, or
power devices such as solar cells, photovoltaic
cells, wind generators, hydro-generators, flywheels,
stand-alone petrol, diesel, natural gas, bio-mass
20 fueled gen-sets, thermoelectric generators, thermo-
ionic generators, fuel cells, internal combustion
engines, solar power, photovoltaic arrays,
hydrothermal power, radioisotope or radioactive
power systems, nuclear fission based power
25 generators, thermal energy conversion devices,
Stirling convertors, Brayton converters, Rankine
converters, micro-miniature dynamic power converters
that are integrated with radioisotope heater units,
alpha/beta-voltaic energy conversion devices, bio-
30 inspired power generation devices, etc. that are
directly connected to the power module that is
connected to the landing platform and deployment
system with a smart charging device,

a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its protection and also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,

19. An unmanned vehicle module's landing and deployment system that is mentioned in Claim 18 and comprising of a landing and deployment system
- 10 -where the landing and deployment platform is comprised of opening/closing doors to align the landed unmanned vehicle to a pre-determined landing region by using the doors or structures attached to the doors (where the doors are parallel to each other and have the capability of approaching or moving away from each other), a first and second alignment mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable base section (where the base section can move vertically or horizontally depending on the need) for further alignment of the unmanned vehicle to the pre-determined landing region (where the first and second alignment beams/structures are parallel to each other and have the capability of approaching or moving away from each other) and also electrically connecting the unmanned vehicle's on-board charging mechanism to the power module for charging of the on-board powering device of unmanned vehicle, having the landing platform and deployment system aiding in the
- 20
- 25
- 30 following functions: deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed for the operation of

the unmanned vehicle and the associated peripherals,
motors, switches, linear transmission mechanisms,
sensors, guiding rails, and other essential
peripherals needed to open/close doors, move the
5 first and second alignment mechanisms,
lifting/descending the landing platform, etc.
functions,
a smart charging mechanism,
-where there exists multiple charging mechanisms such
10 as one of the charging mechanism being located on the
landing platform and deployment system and the second
one being located on-board of the unmanned vehicle,
where the first charging mechanism allows the
electrical contact to be made between the power
15 module and the charging elements integrated into the
body of the unmanned vehicle via metallic contacts of
the first/second alignment mechanisms, and the second
charging mechanism that is located on-board of the
unmanned vehicle that enables the electrical
20 connection be made between the on-board powering
device and the charging mechanism located on the
landing platform and deployment system, furthermore
the charging mechanisms are connected to a power
module with polarity switches in order to safely
25 charge unmanned vehicle's the on-board powering
device and also prevent the electrical shorting of
the unmanned vehicle's the on-board powering device
and power module, the charging mechanism have
multiple states of charging depending on the
30 orientation of the unmanned vehicle after its landing
where it can automatically sense the polarity of the
unmanned vehicle's battery terminals or the voltage
and then open or close the appreciate switches of the
polarity switch in order to initiate the proper

charging without creating any electrical shorts,
completes the charging and then stops the charging
process,

a power module

5 -where the power module is an integrated device that
has a stand-alone power module, a weather station,
a communication/control module, and a smart charging
device,

10 -where the stand alone power module is a device
that can provide electrical energy to the
unmanned vehicle's on-board powering device via
polarity switch and charging mechanisms
installed on the landing platform and deployment
system and on the unmanned vehicle and can be a
15 standalone device or a hybrid combination of the
followings such an electric power supply that is
connected to the grid and where the electricity
is obtained from fossil fuel power plants,
hydroelectric power plants, solar thermal power
20 plants, nuclear power plants, geothermal power
plants, wind power towers and etc., batteries,
or power devices such as solar cells,
photovoltaic cells, wind generators, hydro-
generators, flywheels, stand-alone petrol,
25 diesel, natural gas, bio-mass fueled gen-sets,
thermoelectric generators, thermo-ionic
generators, fuel cells, internal combustion
engines, solar power, photovoltaic arrays,
hydrothermal power, radioisotope or radioactive
30 power systems, nuclear fission based power
generators, thermal energy conversion devices,
Stirling convertors, Brayton converters, Rankine
converters, micro-miniature dynamic power
converters that are integrated with radioisotope

heater units, alpha/beta-voltaic energy conversion devices, bio-inspired power generation devices, etc. that are directly connected to the power module that is connected to the landing platform and deployment system with a smart charging device,

-where the weather station is comprised of either single or multiple sensors that are needed to safely operate the landing platform and deployment system and the unmanned vehicle in the field, where the sensors are comprised of a wind direction sensor to determine the direction of the wind, a wind speed sensor to determine the speed of the wind, a temperature sensor to determine the weather temperature, a rain sensor to determine the presence of rain, a humidity sensor to determine the level of humidity present, a pressure sensor to determine the atmospheric pressure, a solar radiation measuring sensor, a disdrometer to monitor the drop size variation, a transmissometer for measuring the visibility around landing platform and deployment system, a UV light measuring sensor, a ceilometer for measuring the cloud ceiling the a hyper-local weather to accurately estimate the local weather conditions, a dew-point measuring sensor, having these sensors being able to self-calibrate themselves, having the wireless or wired communication in order to feed either individual or aggregated sensor data to the unmanned vehicle or landing platform and deployment system or to the remote user,

-where the communication/control module is comprised of the essential communication and control devices that are needed to operate, manage, monitor all of the functions of the landing platform and deployment system, the unmanned vehicle, the integrated power module, smart landing and self-alignment of the unmanned vehicle, smart charging of the unmanned vehicle, etc.,

-where smart charging mechanism is comprised of multiple charging mechanisms such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where

it can automatically sense the polarity of the
unmanned vehicle's battery terminals or the
voltage and then open or close the appreciate
switches of the polarity switch in order to
5 initiate the proper charging without creating
any electrical shorts, completes the charging
and then stops the charging process,

a canvas or a sliding cover or a moving cover that covers
the landing platform and deployment system for its
10 protection and also aid in the landing of the unmanned
vehicle by protecting against wind during its landing
process,

20. An unmanned vehicle module's landing and deployment
15 system that is mentioned in Claim 19 and comprising of
a landing and deployment system with a landing region
that has precision landing mechanism such as a QR code
-where the landing and deployment platform is
comprised of opening/closing doors to align the
20 landed unmanned vehicle to a pre-determined landing
region by using the doors or structures attached to
the doors (where the doors are parallel to each other
and have the capability of approaching or moving away
from each other), a first and second alignment
25 mechanisms (which is orthogonal to the
opening/closing doors) that is located on a moveable
base section (where the base section can move
vertically or horizontally depending on the need) for
further alignment of the unmanned vehicle to the pre-
30 determined landing region (where the first and second
alignment beams/structures are parallel to each other
and have the capability of approaching or moving away
from each other) and also electrically connecting the

unmanned vehicle's on-board charging mechanism to the power module for charging of the on-board powering device of unmanned vehicle, having the landing region with a QR code and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and deployment system aiding in the following functions: deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed for the operation of the unmanned vehicle and the associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment mechanisms, lifting/descending the landing platform, etc. functions,

a smart charging mechanism,

-where there exists multiple charging mechanisms such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power

module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

15 a power module

-where the power module is an integrated device that has a stand-alone power module, a weather station, a communication/control module, and a smart charging device,

20 -where the stand alone power module is a device that can provide electrical energy to the unmanned vehicle's on-board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device or a hybrid combination of the followings such an electric power supply that is connected to the grid and where the electricity is obtained from fossil fuel power plants,

25 hydroelectric power plants, solar thermal power plants, nuclear power plants, geothermal power plants, wind power towers and etc., batteries, or power devices such as solar cells,

30 photovoltaic cells, wind generators, hydro-

generators, flywheels, stand-alone petrol,
diesel, natural gas, bio-mass fueled gen-sets,
thermoelectric generators, thermo-ionic
generators, fuel cells, internal combustion
5 engines, solar power, photovoltaic arrays,
hydrothermal power, radioisotope or radioactive
power systems, nuclear fission based power
generators, thermal energy conversion devices,
Stirling convertors, Brayton converters, Rankine
10 converters, micro-miniature dynamic power
converters that are integrated with radioisotope
heater units, alpha/beta-voltaic energy
conversion devices, bio-inspired power
generation devices, etc. that are directly
15 connected to the power module that is connected
to the landing platform and deployment system
with a smart charging device,

-where the weather station is comprised of
either single or multiple sensors that are
20 needed to safely operate the landing platform
and deployment system and the unmanned vehicle
in the field, where the sensors are comprised of
a wind direction sensor to determine the
direction of the wind, a wind speed sensor to
25 determine the speed of the wind, a temperature
sensor to determine the weather temperature, a
rain sensor to determine the presence of rain, a
humidity sensor to determine the level of
humidity present, a pressure sensor to determine
30 the atmospheric pressure, a solar radiation
measuring sensor, a disdrometer to monitor the
drop size variation, a transmissometer for
measuring the visibility around landing platform
and deployment system, a UV light measuring

sensor, a ceilometer for measuring the cloud ceiling the a hyper-local weather to accurately estimate the local weather conditions, a dew-point measuring sensor, having these sensors
5 being able to self-calibrate themselves, having the wireless or wired communication in order to feed either individual or aggregated sensor data to the unmanned vehicle or landing platform and deployment system or to the remote user,

10 -where the communication/control module is comprised of the essential communication and control devices that are needed to operate, manage, monitor all of the functions of the landing platform and deployment system, the
15 unmanned vehicle, the integrated power module, smart landing and self-alignment of the unmanned vehicle, smart charging of the unmanned vehicle, etc.,

20 -where smart charging mechanism is comprised of multiple charging mechanisms such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned
25 vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second
30 alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the

landing platform and deployment system,
furthermore the charging mechanisms are
connected to a power module with polarity
switches in order to safely charge unmanned
5 vehicle's the on-board powering device and also
prevent the electrical shorting of the unmanned
vehicle's the on-board powering device and power
module, the charging mechanism have multiple
states of charging depending on the orientation
10 of the unmanned vehicle after its landing where
it can automatically sense the polarity of the
unmanned vehicle's battery terminals or the
voltage and then open or close the appreciate
switches of the polarity switch in order to
15 initiate the proper charging without creating
any electrical shorts, completes the charging
and then stops the charging process,

a canvas or a sliding cover or a moving cover that covers
the landing platform and deployment system for its
20 protection and also aid in the landing of the unmanned
vehicle by protecting against wind during its landing
process,

21. An unmanned vehicle module's landing and deployment
25 system that is mentioned in Claim 20 and comprising of
a landing and deployment system with a landing region
that has precision landing mechanism such as a QR code and
recessed area

-where the landing and deployment platform is
30 comprised of opening/closing doors to align the
landed unmanned vehicle to a pre-determined landing
region by using the doors or structures attached to
the doors (where the doors are parallel to each other

and have the capability of approaching or moving away from each other), a first and second alignment mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable
5 base section (where the base section can move vertically or horizontally depending on the need) for further alignment of the unmanned vehicle to the pre-determined landing region (where the first and second alignment beams/structures are parallel to each other
10 and have the capability of approaching or moving away from each other) and also electrically connecting the unmanned vehicle's on-board charging mechanism to the power module for charging of the on-board powering device of unmanned vehicle, having the landing region
15 with a QR code and a recessed area (which altogether located on the base section that has a resting seat at its fully rested state) and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and
20 deployment system aiding in the following functions: deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed
25 for the operation of the unmanned vehicle and the associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment
30 mechanisms, lifting/descending the landing platform, etc. functions,
an unmanned vehicle with its sensing devices and integrated charging elements and rolling elements attached to its body,

-where the sensing device is a camera to visually detect the QR code that is located on the landing platform for unmanned vehicle's precision landing functionality,

5 -where the unmanned vehicle has its on-board rolling elements such as rolling balls or rolling-element bearing that are integrated into its landing gears such as legs for its easy self-alignment during the alignment process,

10 -where the rolling elements integrated to the body of the unmanned vehicle places themselves into the recessed area of the landing platform for preventing of the accidental or unintentional skidding off of the unmanned
15 vehicle from the landing platform during abnormal weathers,

 -where the unmanned vehicle's charging elements are integrated into the body of the unmanned vehicle for its easy contact to the charging mechanism located on
20 the landing platform and deployment system

 -where the unmanned vehicle's on-board powering device is electrically connected to its on-board charging elements with wires, cables, etc. in order to transfer the electrical energy from the power
25 module,

 a fence with an active or passive deterring mechanisms such electrical shocking or some other deterring mechanisms to maintain the safety of the landing platform and deployment system, of the unmanned vehicle, and of
30 all the other peripherals of the overall system,

 a smart charging mechanism,

 -where there exists multiple charging mechanisms such as one of the charging mechanism being located on the

landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

a power module

-where the power module is an integrated device that has a stand-alone power module, a weather station, a communication/control module, and a smart charging device,

-where the stand alone power module is a device that can provide electrical energy to the

unmanned vehicle's on-board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device or a hybrid combination of the followings such an electric power supply that is connected to the grid and where the electricity is obtained from fossil fuel power plants, hydroelectric power plants, solar thermal power plants, nuclear power plants, geothermal power plants, wind power towers and etc., batteries, or power devices such as solar cells, photovoltaic cells, wind generators, hydro-generators, flywheels, stand-alone petrol, diesel, natural gas, bio-mass fueled gen-sets, thermoelectric generators, thermo-ionic generators, fuel cells, internal combustion engines, solar power, photovoltaic arrays, hydrothermal power, radioisotope or radioactive power systems, nuclear fission based power generators, thermal energy conversion devices, Stirling convertors, Brayton converters, Rankine converters, micro-miniature dynamic power converters that are integrated with radioisotope heater units, alpha/beta-voltaic energy conversion devices, bio-inspired power generation devices, etc. that are directly connected to the power module that is connected to the landing platform and deployment system with a smart charging device,

-where the weather station is comprised of either single or multiple sensors that are needed to safely operate the landing platform and deployment system and the unmanned vehicle

in the field, where the sensors are comprised of a wind direction sensor to determine the direction of the wind, a wind speed sensor to determine the speed of the wind, a temperature sensor to determine the weather temperature, a rain sensor to determine the presence of rain, a humidity sensor to determine the level of humidity present, a pressure sensor to determine the atmospheric pressure, a solar radiation measuring sensor, a disdrometer to monitor the drop size variation, a transmissometer for measuring the visibility around landing platform and deployment system, a UV light measuring sensor, a ceilometer for measuring the cloud ceiling the a hyper-local weather to accurately estimate the local weather conditions, a dew-point measuring sensor, having these sensors being able to self-calibrate themselves, having the wireless or wired communication in order to feed either individual or aggregated sensor data to the unmanned vehicle or landing platform and deployment system or to the remote user,

-where the communication/control module is comprised of the essential communication and control devices that are needed to operate, manage, monitor all of the functions of the landing platform and deployment system, the unmanned vehicle, the integrated power module, smart landing and self-alignment of the unmanned vehicle, smart charging of the unmanned vehicle, etc.,

-where smart charging mechanism is comprised of multiple charging mechanisms such as one of the

charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

a passive or an active thermal management device (with cooling and/or heating capability) to enable the thermal management of the landing platform and deployment system

and thermal management of the Remobox station for different weather or climate conditions,

5 a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its protection and also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,

22. An unmanned vehicle module's landing and deployment
10 system that is comprising of

a landing and deployment system with a landing region that has precision landing mechanism such as a QR code and recessed area

15 -where the landing and deployment platform is comprised of opening/closing doors to align the landed unmanned vehicle to a pre-determined landing region by using the doors or structures attached to the doors (where the doors are parallel to each other and have the capability of approaching or moving away
20 from each other), a first and second alignment mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable base section (where the base section can move vertically or horizontally depending on the need) for
25 further alignment of the unmanned vehicle to the pre-determined landing region (where the first and second alignment beams/structures are parallel to each other and have the capability of approaching or moving away from each other) and also electrically connecting the
30 unmanned vehicle's on-board charging mechanism to the power module for charging of the on-board powering device of unmanned vehicle, having the landing region with a QR code and a recessed area (which altogether

located on the base section that has a resting seat at its fully rested state) and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and deployment system aiding in the following functions:

5 deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed

10 for the operation of the unmanned vehicle and the associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment

15 mechanisms, lifting/descending the landing platform, etc. functions,

an unmanned vehicle with its sensing devices and integrated charging elements and rolling elements attached to its body,

20 -where the sensing device is a camera to visually detect the QR code that is located on the landing platform for unmanned vehicle's precision landing functionality,

-where the unmanned vehicle has its on-board rolling elements such as rolling balls or rolling-element

25 bearing that are integrated into its landing gears such as legs for its easy self-alignment during the alignment process,

-where the rolling elements integrated to the

30 body of the unmanned vehicle places themselves into the recessed area of the landing platform for preventing of the accidental or unintentional skidding off of the unmanned

vehicle from the landing platform during abnormal weathers,

-where the unmanned vehicle's charging elements are integrated into the body of the unmanned vehicle for its easy contact to the charging mechanism located on the landing platform and deployment system

-where the unmanned vehicle's on-board powering device is electrically connected to its on-board charging elements with wires, cables, etc. in order to transfer the electrical energy from the power module,

a smart charging mechanism,

-where there exists multiple charging mechanisms such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing

where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

an integrated remote box station (also known as Remobox) that provides a complete power and sensing solution for the landing platform and deployment system and for the unmanned vehicle,

-where the Remobox station is comprised of standalone power modules such as fuel cell systems, batteries, or other powering devices, a security or sensing device such as a camera, a polarity switch (also known as switchable rectifier), and advanced weather station, a communication/control module, a weed/plant killer integrated with an insecticide/pesticide killer device, a communication device such as an antenna, and a source of renewable power such as solar cells or photovoltaic cells module,

-where the power modules are either standalone or hybridized devices that can provide electrical energy to the unmanned vehicle's on-board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device or a hybrid combination of the followings such an electric power supply that is connected to the grid and where the electricity is obtained from fossil fuel power plants, hydroelectric

power plants, solar thermal power plants,
nuclear power plants, geothermal power plants,
wind power towers and etc., batteries, or power
devices such as solar cells, photovoltaic
5 cells, wind generators, hydro-generators,
flywheels, stand-alone petrol, diesel, natural
gas, bio-mass fueled gen-sets, thermoelectric
generators, thermo-ionic generators, fuel
cells, internal combustion engines, solar
10 power, photovoltaic arrays, hydrothermal power,
radioisotope or radioactive power systems,
nuclear fission based power generators, thermal
energy conversion devices, Stirling convertors,
Brayton converters, Rankine converters, micro-
15 miniature dynamic power converters that are
integrated with radioisotope heater units,
alpha/beta-voltaic energy conversion devices,
bio-inspired power generation devices, etc.
that are directly connected to the power module
20 that is connected to the landing platform and
deployment system with a smart charging device,

-where the security or sensing device is a
camera integrated to the Remobox station in
order to monitor the security and maintenance
25 related activities and also providing a virtual-
line-of-sight to the unmanned vehicle, to the
landing platform and deployment system or to the
remote operator such the pilot in order to meet
the local aviation regulations,

30 -where the polarity switch has smart functions
and is integrated into one of the modules
located within the Remobox station, has multiple
states of operation, and enables the safe

charging of the unmanned vehicle by controlling the polarity circuitry that is independent from the alignment of the unmanned vehicle on the landing platform,

5 -where smart charging mechanism is
 comprised of multiple charging mechanisms
 (and integrated with a polarity switch
 with multiple operating) states such as
 one of the charging mechanism being
10 located on the landing platform and
 deployment system and the second one being
 located on-board of the unmanned vehicle,
 where the first charging mechanism allows
 the electrical contact to be made between
15 the power module and the charging elements
 integrated into the body of the unmanned
 vehicle via metallic contacts of the
 first/second alignment mechanisms, and the
 second charging mechanism that is located
20 on-board of the unmanned vehicle that
 enables the electrical connection be made
 between the on-board powering device and
 the charging mechanism located on the
 landing platform and deployment system,
25 furthermore the charging mechanisms are
 connected to a power module with polarity
 switches in order to safely charge
 unmanned vehicle's the on-board powering
 device and also prevent the electrical
30 shorting of the unmanned vehicle's the on-
 board powering device and power module,
 the charging mechanism have multiple
 states of charging depending on the
 orientation of the unmanned vehicle after

its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

-where the advanced weather station is comprised of either single or multiple sensors that are needed to safely operate the landing platform and deployment system and the unmanned vehicle in the field, where the sensors are comprised of a wind direction sensor to determine the direction of the wind, a wind speed sensor to determine the speed of the wind, a temperature sensor to determine the weather temperature, a rain sensor to determine the presence of rain, a humidity sensor to determine the level of humidity present, a pressure sensor to determine the atmospheric pressure, a solar radiation measuring sensor, a disdrometer to monitor the drop size variation, a transmissometer for measuring the visibility around landing platform and deployment system, a UV light measuring sensor, a ceilometer for measuring the cloud ceiling the a hyper-local weather to accurately estimate the local weather conditions, a dew-point measuring sensor, having these sensors being able to self-calibrate themselves, having the wireless or wired communication in order to feed either individual or aggregated sensor data to the

unmanned vehicle or landing platform and
deployment system or to the remote user,

5 -where the weather station sensors have
 their own power modules such batteries,
 solar cells, photovoltaic cells, or
 batteries that are charged by solar or
 photovoltaic cells, or some other power
 solutions,

10 -where the communication/control module is
 comprised of the essential communication and
 control devices that are needed to operate,
 manage, monitor all of the functions of the
 landing platform and deployment system, the
 unmanned vehicle, the integrated power module,
15 smart landing and self-alignment of the unmanned
 vehicle, smart charging of the unmanned vehicle,
 etc.,

20 -a weed/plant killer device that is integrated
 with a insecticide/pesticide killer device that
 controls and prevents the undesired vegetation
 such as weed, plants, etc., and other small
 animals such as ants, spiders, geckos, etc. that
 may establish blockage for the operation of the
 landing platform and deployment system by
25 covering the externals or creating some sort of
 a short-circuiting events within the landing
 platform and deployment system or the associated
 peripherals,

30 a fence with an active or passive deterring mechanisms
 such electrical shocking or some other deterring
 mechanisms to maintain the safety of the landing platform
 and deployment system, of the unmanned vehicle, and of
 all the other peripherals of the overall system,

a security device such as an anti-theft device or an anti-tamper device that notifies the operator for the situations of security breach related issues,

5 a passive or an active thermal management device (with cooling and/or heating capability) to enable the thermal management of the landing platform and deployment system and thermal management of the Remobox station for different weather or climate conditions,

10 a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its protection and also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,

15 23. An unmanned vehicle module's landing and deployment system that is provided in Claim 22 and comprising of

a landing and deployment system with a landing region that has precision landing mechanism such as a QR code and recessed area

20 -where the landing and deployment platform is comprised of opening/closing doors to align the landed unmanned vehicle to a pre-determined landing region by using the doors or structures attached to the doors (where the doors are parallel to each other and have the capability of approaching or moving away from each other), a first and second alignment mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable base section (where the base section can move vertically or horizontally depending on the need) for further alignment of the unmanned vehicle to the pre-determined landing region (where the first and second alignment beams/structures are parallel to each other

25

30

and have the capability of approaching or moving away from each other) and also electrically connecting the unmanned vehicle's on-board charging mechanism to the power module for charging of the on-board powering device of unmanned vehicle, having the landing region with a QR code and a recessed area (which altogether located on the base section that has a resting seat at its fully rested state) and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and deployment system aiding in the following functions: deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed for the operation of the unmanned vehicle and the associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment mechanisms, lifting/descending the landing platform, etc. functions,

an unmanned vehicle with its sensing devices and integrated charging elements and rolling elements attached to its body,

- where the sensing device is a camera to visually detect the QR code that is located on the landing platform for unmanned vehicle's precision landing functionality,
- where the unmanned vehicle has its on-board rolling elements such as rolling balls or rolling-element bearing that are integrated into its landing gears such as legs for its easy self-alignment during the alignment process,

-where the rolling elements integrated to the body of the unmanned vehicle places themselves into the recessed area of the landing platform for preventing of the accidental or
5 unintentional skidding off of the unmanned vehicle from the landing platform during abnormal weathers,

-where the unmanned vehicle's charging elements are integrated into the body of the unmanned vehicle for
10 its easy contact to the charging mechanism located on the landing platform and deployment system

-where the unmanned vehicle's on-board powering device is electrically connected to its on-board charging elements with wires, cables, etc. in order
15 to transfer the electrical energy from the power module,

a smart charging mechanism,

-where there exists multiple charging mechanisms such as one of the charging mechanism being located on the
20 landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the
25 body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering
30 device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering

device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

an integrated remote box station (also known as Remobox) that provides a complete power and sensing solution, and also have additional interfaces to receive electricity from multiple different sources for the landing platform and deployment system and for the unmanned vehicle,

-where the Remobox station is comprised of standalone power modules such as fuel cell systems, batteries, or other powering devices, have the capability of receiving electrical energy from multiple different sources in its vicinity, a security or sensing device such as a camera, a polarity switch (also known as switchable rectifier), and advanced weather station, a communication/control module, a weed/plant killer integrated with an insecticide/pesticide killer device, a communication device such as an antenna, and a source of renewable power such as solar cells or photovoltaic cells module,

-where the power modules are either standalone or hybridized devices that can provide electrical energy to the unmanned vehicle's on-

board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device

5 or a hybrid combination of the followings such an electric power supply that is connected to the grid and where the electricity is obtained from fossil fuel power plants, hydroelectric power plants, solar thermal power plants,

10 nuclear power plants, geothermal power plants, wind power towers and etc., batteries, or power devices such as solar cells, photovoltaic cells, wind generators, hydro-generators, flywheels, stand-alone petrol, diesel, natural

15 gas, bio-mass fueled gen-sets, thermoelectric generators, thermo-ionic generators, fuel cells, internal combustion engines, solar power, photovoltaic arrays, hydrothermal power, radioisotope or radioactive power systems,

20 nuclear fission based power generators, thermal energy conversion devices, Stirling convertors, Brayton converters, Rankine converters, micro-miniature dynamic power converters that are integrated with radioisotope heater units,

25 alpha/beta-voltaic energy conversion devices, bio-inspired power generation devices, etc. that are directly connected to the power module that is connected to the landing platform and deployment system with a smart charging device,

30 -where its additional interfaces allows the transfer of electrical energy from sources existing nearby such as a solar farm or a wind farm or any other renewable or un-renewable power producing devices or power plants,

-where the security or sensing device is a camera integrated to the Remobox station in order to monitor the security and maintenance related activities and also providing a virtual-
5 line-of-sight to the unmanned vehicle, to the landing platform and deployment system or to the remote operator such the pilot in order to meet the local aviation regulations,

-where the polarity switch has smart functions and is integrated into one of the modules
10 located within the Remobox station, has multiple states of operation, and enables the safe charging of the unmanned vehicle by controlling the polarity circuitry that is independent from
15 the alignment of the unmanned vehicle on the landing platform,

-where smart charging mechanism is comprised of multiple charging mechanisms (and integrated with a polarity switch
20 with multiple operating) states such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle,
25 where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the
30 first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made

between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

-where the advanced weather station is comprised of either single or multiple sensors that are needed to safely operate the landing platform and deployment system and the unmanned vehicle in the field, where the sensors are comprised of a wind direction sensor to determine the direction of the wind, a wind speed sensor to determine the speed of the wind, a temperature sensor to determine the weather temperature, a rain sensor to determine the presence of rain, a humidity sensor to determine the level of humidity present, a

pressure sensor to determine the atmospheric pressure, a solar radiation measuring sensor, a disdrometer to monitor the drop size variation, a transmissometer for measuring the visibility around landing platform and deployment system, a UV light measuring sensor, a ceilometer for measuring the cloud ceiling the a hyper-local weather to accurately estimate the local weather conditions, a dew-point measuring sensor, having these sensors being able to self-calibrate themselves, having the wireless or wired communication in order to feed either individual or aggregated sensor data to the unmanned vehicle or landing platform and deployment system or to the remote user,

-where the weather station sensors have their own power modules such batteries, solar cells, photovoltaic cells, or batteries that are charged by solar or photovoltaic cells, or some other power solutions,

-where the communication/control module is comprised of the essential communication and control devices that are needed to operate, manage, monitor all of the functions of the landing platform and deployment system, the unmanned vehicle, the integrated power module, smart landing and self-alignment of the unmanned vehicle, smart charging of the unmanned vehicle, etc.,

-a weed/plant killer device that is integrated with a insecticide/pesticide killer device that controls and prevents the undesired vegetation

such as weed, plants, etc., and other small animals such as ants, spiders, geckos, etc. that may establish blockage for the operation of the landing platform and deployment system by covering the externals or creating some sort of a short-circuiting events within the landing platform and deployment system or the associated peripherals,

a fence with an active or passive deterring mechanisms such electrical shocking or some other deterring mechanisms to maintain the safety of the landing platform and deployment system, of the unmanned vehicle, and of all the other peripherals of the overall system,

a security device such as an anti-theft device or an anti-tamper device that notifies the operator for the situations of security breach related issues,

a passive or an active thermal management device (with cooling and/or heating capability) to enable the thermal management of the landing platform and deployment system and thermal management of the Remobox station for different weather or climate conditions,

a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its protection and also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,

24. An unmanned vehicle module's landing and deployment system that is provided in Claim 23 and comprising of a landing and deployment system with a landing region that has precision landing mechanism such as a QR code and recessed area

-where the landing and deployment platform is comprised of opening/closing doors to align the landed unmanned vehicle to a pre-determined landing region by using the doors or structures attached to the doors (where the doors are parallel to each other and have the capability of approaching or moving away from each other), a first and second alignment mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable base section (where the base section can move vertically or horizontally depending on the need) for further alignment of the unmanned vehicle to the pre-determined landing region (where the first and second alignment beams/structures are parallel to each other and have the capability of approaching or moving away from each other) and also electrically connecting the unmanned vehicle's on-board charging mechanism to the power module for charging of the on-board powering device of unmanned vehicle, having the landing region with a QR code and a recessed area (which altogether located on the base section that has a resting seat at its fully rested state) and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and deployment system aiding in the following functions: deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed for the operation of the unmanned vehicle and the associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment

mechanisms, lifting/descending the landing platform,
etc. functions,

- where a solar cell module or photovoltaic module is integrated to the body of the landing platform and deployment system for generation of additional electrical energy,
- where smart charging mechanisms are installed on the first/second alignment mechanisms via attachment of charging structures with electrically insulating materials to further improve the smart charging mechanism by prevent electrical hazards that might be surfacing due to intimate contacts of the first/second alignment mechanisms and the moving mechanisms existing within the landing platform and deployment system,

an unmanned vehicle with its sensing devices and integrated charging elements and rolling elements attached to its body,

- where the sensing device is a camera to visually detect the QR code that is located on the landing platform for unmanned vehicle's precision landing functionality,
- where the unmanned vehicle has its on-board rolling elements such as rolling balls or rolling-element bearing that are integrated into its landing gears such as legs for its easy self-alignment during the alignment process,
- where the rolling elements integrated to the body of the unmanned vehicle places themselves into the recessed area of the landing platform for preventing of the accidental or unintentional skidding off of the unmanned

vehicle from the landing platform during
abnormal weathers,

-where the unmanned vehicle's charging elements are
integrated into the body of the unmanned vehicle for
5 its easy contact to the charging mechanism located on
the landing platform and deployment system

-where the unmanned vehicle's on-board powering
device is electrically connected to its on-board
charging elements with wires, cables, etc. in order
10 to transfer the electrical energy from the power
module,

a smart charging mechanism,

-where there exists multiple charging mechanisms such
as one of the charging mechanism being located on the
15 landing platform and deployment system and the second
one being located on-board of the unmanned vehicle,
where the first charging mechanism allows the
electrical contact to be made between the power
module and the charging elements integrated into the
20 body of the unmanned vehicle via metallic contacts of
the first/second alignment mechanisms, and the second
charging mechanism that is located on-board of the
unmanned vehicle that enables the electrical
connection be made between the on-board powering
25 device and the charging mechanism located on the
landing platform and deployment system, furthermore
the charging mechanisms are connected to a power
module with polarity switches in order to safely
charge unmanned vehicle's the on-board powering
30 device and also prevent the electrical shorting of
the unmanned vehicle's the on-board powering device
and power module, the charging mechanism have
multiple states of charging depending on the
orientation of the unmanned vehicle after its landing

where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

an integrated remote box station (also known as Remobox) that provides a complete power and sensing solution, and also have additional interfaces to receive electricity from multiple different sources for the landing platform and deployment system and for the unmanned vehicle,

-where the Remobox station is comprised of standalone power modules such as fuel cell systems, batteries, or other powering devices, have the capability of receiving electrical energy from multiple different sources in its vicinity, a security or sensing device such as a camera, a polarity switch (also known as switchable rectifier), and advanced weather station, a communication/control module, a weed/plant killer integrated with an insecticide/pesticide killer device, a communication device such as an antenna, and a source of renewable power such as solar cells or photovoltaic cells module,

-where the power modules are either standalone or hybridized devices that can provide electrical energy to the unmanned vehicle's on-board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device or a hybrid combination of the followings such

an electric power supply that is connected to the grid and where the electricity is obtained from fossil fuel power plants, hydroelectric power plants, solar thermal power plants, nuclear power plants, geothermal power plants, wind power towers and etc., batteries, or power devices such as solar cells, photovoltaic cells, wind generators, hydro-generators, flywheels, stand-alone petrol, diesel, natural gas, bio-mass fueled gen-sets, thermoelectric generators, thermo-ionic generators, fuel cells, internal combustion engines, solar power, photovoltaic arrays, hydrothermal power, radioisotope or radioactive power systems, nuclear fission based power generators, thermal energy conversion devices, Stirling convertors, Brayton converters, Rankine converters, micro-miniature dynamic power converters that are integrated with radioisotope heater units, alpha/beta-voltaic energy conversion devices, bio-inspired power generation devices, etc. that are directly connected to the power module that is connected to the landing platform and deployment system with a smart charging device,

-where its additional interfaces allows the transfer of electrical energy from sources existing nearby such as a solar farm or a wind farm or any other renewable or un-renewable power producing devices or power plants,

-where the security or sensing device is a camera integrated to the Remobox station in order to monitor the security and maintenance related activities and also providing a virtual-

line-of-sight to the unmanned vehicle, to the landing platform and deployment system or to the remote operator such the pilot in order to meet the local aviation regulations,

5 -where the polarity switch has smart functions and is integrated into one of the modules located within the Remobox station, has multiple states of operation, and enables the safe charging of the unmanned vehicle by controlling
10 the polarity circuitry that is independent from the alignment of the unmanned vehicle on the landing platform,

 -where smart charging mechanism is comprised of multiple charging mechanisms
15 (and integrated with a polarity switch with multiple operating) states such as one of the charging mechanism being located on the landing platform and deployment system and the second one being
20 located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned
25 vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made
30 between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are

connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

-where the advanced weather station is comprised of either single or multiple sensors that are needed to safely operate the landing platform and deployment system and the unmanned vehicle in the field, where the sensors are comprised of a wind direction sensor to determine the direction of the wind, a wind speed sensor to determine the speed of the wind, a temperature sensor to determine the weather temperature, a rain sensor to determine the presence of rain, a humidity sensor to determine the level of humidity present, a pressure sensor to determine the atmospheric pressure, a solar radiation measuring sensor, a disdrometer to monitor the drop size variation, a transmissometer for measuring the visibility

around landing platform and deployment system,
a UV light measuring sensor, a ceilometer for
measuring the cloud ceiling the a hyper-local
weather to accurately estimate the local
5 weather conditions, a dew-point measuring
sensor, having these sensors being able to
self-calibrate themselves, having the wireless
or wired communication in order to feed either
individual or aggregated sensor data to the
10 unmanned vehicle or landing platform and
deployment system or to the remote user,

-where the weather station sensors have
their own power modules such batteries,
solar cells, photovoltaic cells, or
15 batteries that are charged by solar or
photovoltaic cells, or some other power
solutions,

-where the communication/control module is
comprised of the essential communication and
20 control devices that are needed to operate,
manage, monitor all of the functions of the
landing platform and deployment system, the
unmanned vehicle, the integrated power module,
smart landing and self-alignment of the unmanned
25 vehicle, smart charging of the unmanned vehicle,
etc.,

-a weed/plant killer device that is integrated
with a insecticide/pesticide killer device that
controls and prevents the undesired vegetation
30 such as weed, plants, etc., and other small
animals such as ants, spiders, geckos, etc. that
may establish blockage for the operation of the
landing platform and deployment system by

covering the externals or creating some sort of a short-circuiting events within the landing platform and deployment system or the associated peripherals,

- 5 a fence with an active or passive deterring mechanisms such electrical shocking or some other deterring mechanisms to maintain the safety of the landing platform and deployment system, of the unmanned vehicle, and of all the other peripherals of the overall system,
- 10 a security device such as an anti-theft device or an anti-tamper device that notifies the operator for the situations of security breach related issues,
- a passive or an active thermal management device (with cooling and/or heating capability) to enable the thermal
- 15 management of the landing platform and deployment system and thermal management of the Remobox station for different weather or climate conditions,
- a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its
- 20 protection and also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,

25. An unmanned vehicle module's landing and deployment
- 25 system that is provided in Claim 24 and comprising of
- a landing and deployment system with a landing region that has precision landing mechanism such as a QR code and recessed area and an improved charging mechanisms that are located both on the landing platform and on the unmanned
- 30 vehicle,
- where the landing and deployment platform is comprised of opening/closing doors to align the

landed unmanned vehicle to a pre-determined landing region by using the doors or structures attached to the doors (where the doors are parallel to each other and have the capability of approaching or moving away from each other), a first and second alignment mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable base section (where the base section can move vertically or horizontally depending on the need) for further alignment of the unmanned vehicle to the pre-determined landing region (where the first and second alignment beams/structures are parallel to each other and have the capability of approaching or moving away from each other) and also electrically connecting the unmanned vehicle's on-board charging mechanism to the power module for charging of the on-board powering device of unmanned vehicle, having the landing region with a QR code and a recessed area (which altogether located on the base section that has a resting seat at its fully rested state) and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and deployment system aiding in the following functions: deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed for the operation of the unmanned vehicle and the associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment mechanisms, lifting/descending the landing platform, etc. functions,

- where a solar cell module or photovoltaic module is integrated to the body of the landing platform and deployment system for generation of additional electrical energy,
- 5 -where smart charging mechanisms are installed on the first/second alignment mechanisms via attachment of charging structures with electrically insulating materials to further improve the smart charging mechanism by prevent
- 10 electrical hazards that might be surfacing due to intimate contacts of the first/second alignment mechanisms and the moving mechanisms existing within the landing platform and deployment system,
- 15 -where the landing platform and deployment system has its own processing unit to control its own functionality, the necessary functions of the unmanned vehicle, the necessary functions of the Remobox station, and all the
- 20 other peripherals for further improved autonomous operations,
- an unmanned vehicle with its sensing devices and integrated charging elements and rolling elements attached to its body,
- 25 -where the sensing device is a camera to visually detect the QR code that is located on the landing platform for unmanned vehicle's precision landing functionality,
- 30 -where the unmanned vehicle has its on-board rolling elements such as rolling balls or rolling-element bearing that are integrated into its landing gears such as legs for its easy self-alignment during the alignment process,

- 5 -where the rolling elements integrated to the
body of the unmanned vehicle places themselves
into the recessed area of the landing platform
for preventing of the accidental or
unintentional skidding off of the unmanned
vehicle from the landing platform during
abnormal weathers,
- 10 -where the rolling elements that are
attached to the unmanned vehicle's body are
electrically isolated from the unmanned
vehicle's and landing platform and
deployment system's charging mechanisms to
prevent electrical hazards to other
peripherals,
- 15 -where the unmanned vehicle's charging elements are
integrated into the body of the unmanned vehicle for
its easy contact to the charging mechanism located on
the landing platform and deployment system
- 20 -where the unmanned charging elements are made
of electrically conductive elements such as
aluminum, copper, or any other relevant and
electrically conductive materials (including
the electrically conductive plastics, polymers,
composites, ceramics, etc.) and establishing
- 25 the electrical contact with the charging plates
by physically touching each other,
- 30 -where the unmanned vehicle's on-board powering
device is electrically connected to its on-board
charging elements with wires, cables, etc. in order
to transfer the electrical energy from the power
module,
- a smart charging mechanism,
- where there exists multiple charging mechanisms such
as one of the charging mechanism being located on the

landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

an integrated remote box station (also known as Remobox) that provides a complete power and sensing solutions including security of the station, and also have additional interfaces to receive electricity from multiple different sources for the landing platform and deployment system and for the unmanned vehicle,

-where the Remobox station is comprised of standalone power modules such as fuel cell systems, batteries, or other powering devices, have the capability of receiving electrical energy from multiple different sources in its vicinity, a security or sensing device such as a camera, a polarity switch (also known as switchable rectifier), and advanced weather station, a communication/control module, a weed/plant killer integrated with an insecticide/pesticide killer device, a communication device such as an antenna, and a source of renewable power such as solar cells or photovoltaic cells module,

-where the power modules are either standalone or hybridized devices that can provide electrical energy to the unmanned vehicle's on-board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device or a hybrid combination of the followings such an electric power supply that is connected to the grid and where the electricity is obtained from fossil fuel power plants, hydroelectric power plants, solar thermal power plants, nuclear power plants, geothermal power plants, wind power towers and etc., batteries, or power devices such as solar cells, photovoltaic cells, wind generators, hydro-generators, flywheels, stand-alone petrol, diesel, natural gas, bio-mass fueled gen-sets, thermoelectric generators, thermo-ionic generators, fuel cells, internal combustion engines, solar power, photovoltaic arrays, hydrothermal power,

radioisotope or radioactive power systems,
nuclear fission based power generators, thermal
energy conversion devices, Stirling convertors,
Brayton converters, Rankine converters, micro-
miniature dynamic power converters that are
integrated with radioisotope heater units,
alpha/beta-voltaic energy conversion devices,
bio-inspired power generation devices, etc.
that are directly connected to the power module
that is connected to the landing platform and
deployment system with a smart charging device,
-where its additional interfaces allows the
transfer of electrical energy from sources
existing nearby such as a solar farm or a wind
farm or any other renewable or un-renewable
power producing devices or power plants,
-where the security or sensing device is a
camera integrated to the Remobox station in
order to monitor the security and maintenance
related activities and also providing a virtual-
line-of-sight to the unmanned vehicle, to the
landing platform and deployment system or to the
remote operator such the pilot in order to meet
the local aviation regulations,
-where the polarity switch has smart functions
and is integrated into one of the modules
located within the Remobox station, has multiple
states of operation, and enables the safe
charging of the unmanned vehicle by controlling
the polarity circuitry that is independent from
the alignment of the unmanned vehicle on the
landing platform,

-where smart charging mechanism is
comprised of multiple charging mechanisms
(and integrated with a polarity switch
with multiple operating) states such as
5 one of the charging mechanism being
located on the landing platform and
deployment system and the second one being
located on-board of the unmanned vehicle,
where the first charging mechanism allows
10 the electrical contact to be made between
the power module and the charging elements
integrated into the body of the unmanned
vehicle via metallic contacts of the
first/second alignment mechanisms, and the
15 second charging mechanism that is located
on-board of the unmanned vehicle that
enables the electrical connection be made
between the on-board powering device and
the charging mechanism located on the
20 landing platform and deployment system,
furthermore the charging mechanisms are
connected to a power module with polarity
switches in order to safely charge
unmanned vehicle's the on-board powering
25 device and also prevent the electrical
shorting of the unmanned vehicle's the on-
board powering device and power module,
the charging mechanism have multiple
states of charging depending on the
30 orientation of the unmanned vehicle after
its landing where it can automatically
sense the polarity of the unmanned
vehicle's battery terminals or the voltage
and then open or close the appreciate

switches of the polarity switch in order
to initiate the proper charging without
creating any electrical shorts, completes
the charging and then stops the charging
5 process,

-where the advanced weather station is
comprised of either single or multiple sensors
that are needed to safely operate the landing
platform and deployment system and the unmanned
10 vehicle in the field, where the sensors are
comprised of a wind direction sensor to
determine the direction of the wind, a wind
speed sensor to determine the speed of the
wind, a temperature sensor to determine the
15 weather temperature, a rain sensor to determine
the presence of rain, a humidity sensor to
determine the level of humidity present, a
pressure sensor to determine the atmospheric
pressure, a solar radiation measuring sensor, a
20 disdrometer to monitor the drop size variation,
a transmissometer for measuring the visibility
around landing platform and deployment system,
a UV light measuring sensor, a ceilometer for
measuring the cloud ceiling the a hyper-local
25 weather to accurately estimate the local
weather conditions, a dew-point measuring
sensor, having these sensors being able to
self-calibrate themselves, having the wireless
or wired communication in order to feed either
30 individual or aggregated sensor data to the
unmanned vehicle or landing platform and
deployment system or to the remote user,

- 5 -where the weather station sensors have
 their own power modules such batteries,
 solar cells, photovoltaic cells, or
 batteries that are charged by solar or
 photovoltaic cells, or some other power
 solutions,
- 10 -where the communication/control module is
 comprised of the essential communication and
 control devices that are needed to operate,
 manage, monitor all of the functions of the
 landing platform and deployment system, the
 unmanned vehicle, the integrated power module,
 smart landing and self-alignment of the unmanned
 vehicle, smart charging of the unmanned vehicle,
15 etc.,
- 20 -a weed/plant killer device that is integrated
 with an insecticide/pesticide killer device that
 controls and prevents the undesired vegetation
 such as weed, plants, etc., and other small
 animals such as ants, spiders, geckos, etc. that
 may establish blockage for the operation of the
 landing platform and deployment system by
 covering the externals or creating some sort of
 a short-circuiting events within the landing
25 platform and deployment system or the associated
 peripherals,
- 30 -where the security sensing device installed to
 the Remobox station is an anti-theft device or
 an anti-tamper device that alerts the owner or
 the user of the landing platform and deployment
 system, the unmanned vehicle and all the other
 associated peripherals for security or safety
 breach issues,

-where the Remobox station has its own processing unit to control its own functionality, the necessary functions of the unmanned vehicle, the necessary functions of the landing platform and deployment system, and all the other peripherals for further improved autonomous operations,

a fence with an active or passive deterring mechanisms such electrical shocking or some other deterring mechanisms to maintain the safety of the landing platform and deployment system, of the unmanned vehicle, and of all the other peripherals of the overall system,

a security device such as an anti-theft device or an anti-tamper device that notifies the operator for the situations of security breach related issues,

a passive or an active thermal management device (with cooling and/or heating capability) to enable the thermal management of the landing platform and deployment system and thermal management of the Remobox station for different weather or climate conditions,

a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its protection and also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,

26. An unmanned vehicle module's landing and deployment system that is provided in Claim 25 and comprising of a landing and deployment system with a landing region that has precision landing mechanism such as a QR-code-like code generating device and recessed area and an improved

charging mechanisms that are located both on the landing platform and on the unmanned vehicle,

-where the landing and deployment platform is comprised of opening/closing doors to align the

5 landed unmanned vehicle to a pre-determined landing region by using the doors or structures attached to the doors (where the doors are parallel to each other and have the capability of approaching or moving away from each other), a first and second alignment

10 mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable base section (where the base section can move vertically or horizontally depending on the need) for further alignment of the unmanned vehicle to the pre-

15 determined landing region (where the first and second alignment beams/structures are parallel to each other and have the capability of approaching or moving away from each other) and also electrically connecting the unmanned vehicle's on-board charging mechanism to the

20 power module for charging of the on-board powering device of unmanned vehicle, having the landing region with a QR-code-like code by using light illuminating devices and a recessed area (which altogether located on the base section that has a resting seat at its

25 fully rested state) and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and deployment system aiding in the following functions:

30 deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed for the operation of the unmanned vehicle and the associated peripherals, motors, switches, linear

transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment mechanisms, lifting/descending the landing platform, etc. functions,

5

- where a solar cell module or photovoltaic module is integrated to the body of the landing platform and deployment system for generation of additional electrical energy,

10

- where smart charging mechanisms are installed on the first/second alignment mechanisms via attachment of charging structures with electrically insulating materials to further improve the smart charging mechanism by prevent electrical hazards that might be surfacing due to intimate contacts of the first/second alignment mechanisms and the moving mechanisms existing within the landing platform and deployment system,

15

20

- where the landing platform and deployment system has its own processing unit to control its own functionality, the necessary functions of the unmanned vehicle, the necessary functions of the Remobox station, and all the other peripherals for further improved autonomous operations,

25

30

- where the a QR-code-like code by using light illuminating devices are used to generate a specific code to aid in the precision landing of the unmanned vehicle and this can be achieved by using the LED-light like devices in their multiple numbers with a control that turns on/off certain lights in order to

generate a very specific pattern that would resemble a QR code,
an unmanned vehicle with its sensing devices and integrated charging elements and rolling elements
5 attached to its body,
-where the sensing device is a camera to visually detect the QR-code-like code that is generated on the landing platform for unmanned vehicle's precision landing functionality,
10 -where the unmanned vehicle has its on-board rolling elements such as rolling balls or rolling-element bearing that are integrated into its landing gears such as legs for its easy self-alignment during the alignment process,
15 -where the rolling elements integrated to the body of the unmanned vehicle places themselves into the recessed area of the landing platform for preventing of the accidental or unintentional skidding off of the unmanned
20 vehicle from the landing platform during abnormal weathers,
-where the rolling elements that are attached to the unmanned vehicle's body are electrically isolated from the unmanned
25 vehicle's and landing platform and deployment system's charging mechanisms to prevent electrical hazards to other peripherals,
-where the unmanned vehicle's charging elements are
30 integrated into the body of the unmanned vehicle for its easy contact to the charging mechanism located on the landing platform and deployment system
-where the unmanned charging elements are made of electrically conductive elements such as

aluminum, copper, or any other relevant and electrically conductive materials (including the electrically conductive plastics, polymers, composites, ceramics, etc.) and establishing the electrical contact with the charging plates by physically touching each other,

-where the unmanned vehicle's on-board powering device is electrically connected to its on-board charging elements with wires, cables, etc. in order to transfer the electrical energy from the power module,

a smart charging mechanism,

-where there exists multiple charging mechanisms such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing

where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

an integrated remote box station (also known as Remobox) that provides a complete power and sensing solutions including security of the station, and also have additional interfaces to receive electricity from multiple different sources for the landing platform and deployment system and for the unmanned vehicle,

-where the Remobox station is comprised of standalone power modules such as fuel cell systems, batteries, or other powering devices, have the capability of receiving electrical energy from multiple different sources in its vicinity, a security or sensing device such as a camera, a polarity switch (also known as switchable rectifier), and advanced weather station, a communication/control module, a weed/plant killer integrated with an insecticide/pesticide killer device, a communication device such as an antenna, and a source of renewable power such as solar cells or photovoltaic cells module,

-where the power modules are either standalone or hybridized devices that can provide electrical energy to the unmanned vehicle's on-board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device

or a hybrid combination of the followings such
an electric power supply that is connected to
the grid and where the electricity is obtained
from fossil fuel power plants, hydroelectric
5 power plants, solar thermal power plants,
nuclear power plants, geothermal power plants,
wind power towers and etc., batteries, or power
devices such as solar cells, photovoltaic
cells, wind generators, hydro-generators,
10 flywheels, stand-alone petrol, diesel, natural
gas, bio-mass fueled gen-sets, thermoelectric
generators, thermo-ionic generators, fuel
cells, internal combustion engines, solar
power, photovoltaic arrays, hydrothermal power,
15 radioisotope or radioactive power systems,
nuclear fission based power generators, thermal
energy conversion devices, Stirling convertors,
Brayton converters, Rankine converters, micro-
miniature dynamic power converters that are
20 integrated with radioisotope heater units,
alpha/beta-voltaic energy conversion devices,
bio-inspired power generation devices, etc.
that are directly connected to the power module
that is connected to the landing platform and
25 deployment system with a smart charging device,
-where its additional interfaces allows the
transfer of electrical energy from sources
existing nearby such as a solar farm or a wind
farm or any other renewable or un-renewable
30 power producing devices or power plants,
-where the security or sensing device is a
camera integrated to the Remobox station in
order to monitor the security and maintenance

related activities and also providing a virtual-line-of-sight to the unmanned vehicle, to the landing platform and deployment system or to the remote operator such the pilot in order to meet
5 the local aviation regulations,

-where the polarity switch has smart functions and is integrated into one of the modules located within the Remobox station, has multiple states of operation, and enables the safe
10 charging of the unmanned vehicle by controlling the polarity circuitry that is independent from the alignment of the unmanned vehicle on the landing platform,

-where smart charging mechanism is
15 comprised of multiple charging mechanisms (and integrated with a polarity switch with multiple operating) states such as one of the charging mechanism being located on the landing platform and
20 deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements
25 integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that
30 enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system,

furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

-where the advanced weather station is comprised of either single or multiple sensors that are needed to safely operate the landing platform and deployment system and the unmanned vehicle in the field, where the sensors are comprised of a wind direction sensor to determine the direction of the wind, a wind speed sensor to determine the speed of the wind, a temperature sensor to determine the weather temperature, a rain sensor to determine the presence of rain, a humidity sensor to determine the level of humidity present, a pressure sensor to determine the atmospheric pressure, a solar radiation measuring sensor, a disdrometer to monitor the drop size variation,

a transmissometer for measuring the visibility around landing platform and deployment system, a UV light measuring sensor, a ceilometer for measuring the cloud ceiling the a hyper-local weather to accurately estimate the local weather conditions, a dew-point measuring sensor, having these sensors being able to self-calibrate themselves, having the wireless or wired communication in order to feed either individual or aggregated sensor data to the unmanned vehicle or landing platform and deployment system or to the remote user,

-where the weather station sensors have their own power modules such batteries, solar cells, photovoltaic cells, or batteries that are charged by solar or photovoltaic cells, or some other power solutions,

-where the communication/control module is comprised of the essential communication and control devices that are needed to operate, manage, monitor all of the functions of the landing platform and deployment system, the unmanned vehicle, the integrated power module, smart landing and self-alignment of the unmanned vehicle, smart charging of the unmanned vehicle, etc.,

-a weed/plant killer device that is integrated with an insecticide/pesticide killer device that controls and prevents the undesired vegetation such as weed, plants, etc., and other small animals such as ants, spiders, geckos, etc. that may establish blockage for the operation of the

landing platform and deployment system by covering the externals or creating some sort of a short-circuiting events within the landing platform and deployment system or the associated peripherals,

-where the security sensing device installed to the Remobox station is an anti-theft device or an anti-tamper device that alerts the owner or the user of the landing platform and deployment system, the unmanned vehicle and all the other associated peripherals for security or safety breach issues,

-where the Remobox station has its own processing unit to control its own functionality, the necessary functions of the unmanned vehicle, the necessary functions of the landing platform and deployment system, and all the other peripherals for further improved autonomous operations,

a fence with an active or passive deterring mechanisms such electrical shocking or some other deterring mechanisms to maintain the safety of the landing platform and deployment system, of the unmanned vehicle, and of all the other peripherals of the overall system,

a security device such as an anti-theft device or an anti-tamper device that notifies the operator for the situations of security breach related issues,

a passive or an active thermal management device (with cooling and/or heating capability) to enable the thermal management of the landing platform and deployment system and thermal management of the Remobox station for different weather or climate conditions,

a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its protection and also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,

27. An alternative embodiment of the unmanned vehicle module's landing and deployment system that is provided in Claim 26 and comprising of

a landing and deployment system with a landing region that has precision landing mechanism such as a QR-code-like code generating device and recessed area and an improved charging mechanisms that are located both on the landing platform and on the unmanned vehicle,

-where the landing and deployment platform is comprised of opening/closing doors to align the landed unmanned vehicle to a pre-determined landing region by using the doors or structures attached to the doors (where the doors are parallel to each other and have the capability of approaching or moving away from each other), a first and second alignment mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable base section (where the base section can move vertically or horizontally depending on the need) for further alignment of the unmanned vehicle to the pre-determined landing region (where the first and second alignment beams/structures are parallel to each other and have the capability of approaching or moving away from each other) and also electrically connecting the unmanned vehicle's on-board charging mechanism to the power module for charging of the on-board powering device of unmanned vehicle, having the landing region with a QR-code-like code by using light illuminating devices and a recessed area (which altogether located

on the base section that has a resting seat at its fully rested state) and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and deployment system aiding in the following functions:

5 deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed

10 for the operation of the unmanned vehicle and the associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment

15 mechanisms, lifting/descending the landing platform, etc. functions,

- where a solar cell module or photovoltaic module is integrated to the body of the landing platform and deployment system for generation
- 20 of additional electrical energy,
- where the solar cell module(s) have the capability of staying planar or moving around a certain axis in order to keep the surface of the solar cell clean, improve
- 25 the solar energy collection efficiency, etc.
- where smart charging mechanisms are installed on the first/second alignment mechanisms via attachment of charging structures with
- 30 electrically insulating materials to further improve the smart charging mechanism by prevent electrical hazards that might be surfacing due to intimate contacts of the first/second alignment mechanisms and the moving mechanisms

existing within the landing platform and deployment system,
-where the landing platform and deployment system has its own processing unit to control
5 its own functionality, the necessary functions of the unmanned vehicle, the necessary functions of the Remobox station, and all the other peripherals for further improved autonomous operations,
10 -where the a QR-code-like code by using light illuminating devices are used to generate a specific code to aid in the precision landing of the unmanned vehicle and this can be achieved by using the LED-light like devices in
15 their multiple numbers with a control that turns on/off certain lights in order to generate a very specific pattern that would resemble a QR code,
-where the exterior look of the landing and deployment system is designed to have a
20 camouflaged texture for defense applications using the appropriate color/texture/markings such as green colored exterior or camo textured colored exterior, etc.,
25 an unmanned vehicle with its sensing devices and integrated charging elements and rolling elements attached to its body,
-where the sensing device is a camera to visually detect the QR-code-like code that is generated on the
30 landing platform for unmanned vehicle's precision landing functionality,
-where the unmanned vehicle has its on-board rolling elements such as rolling balls or rolling-element bearing that are integrated into its landing gears

such as legs for its easy self-alignment during the alignment process,

5 -where the rolling elements integrated to the body of the unmanned vehicle places themselves into the recessed area of the landing platform for preventing of the accidental or unintentional skidding off of the unmanned vehicle from the landing platform during abnormal weathers,

10 -where the rolling elements that are attached to the unmanned vehicle's body are electrically isolated from the unmanned vehicle's and landing platform and deployment system's charging mechanisms to
15 prevent electrical hazards to other peripherals,

 -where the unmanned vehicle's charging elements are integrated into the body of the unmanned vehicle for its easy contact to the charging mechanism located on
20 the landing platform and deployment system

 -where the unmanned charging elements are made of electrically conductive elements such as aluminum, copper, or any other relevant and electrically conductive materials (including
25 the electrically conductive plastics, polymers, composites, ceramics, etc.) and establishing the electrical contact with the charging plates by physically touching each other,

 -where the unmanned vehicle's on-board powering
30 device is electrically connected to its on-board charging elements with wires, cables, etc. in order to transfer the electrical energy from the power module,

-where the exterior look of the unmanned vehicle is designed to have a camouflaged texture for defense applications using the appropriate color/texture/markings such as green colored exterior or camo textured colored exterior, etc.,

5 a smart charging mechanism,

-where there exists multiple charging mechanisms such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle,

10 where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing

15 20 25 30

where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts,

completes the charging and then stops the charging process,

an integrated remote box station (also known as Remobox) that provides a complete power and sensing solutions including security of the station, and also have additional interfaces to receive electricity from multiple different sources for the landing platform and deployment system and for the unmanned vehicle,

-where the Remobox station is comprised of standalone power modules such as fuel cell systems, batteries, or other powering devices, have the capability of receiving electrical energy from multiple different sources in its vicinity, a security or sensing device such as a camera, a polarity switch (also known as switchable rectifier), and advanced weather station, a communication/control module, a weed/plant killer integrated with an insecticide/pesticide killer device, a communication device such as an antenna, and a source of renewable power such as solar cells or photovoltaic cells module,

-where the power modules are either standalone or hybridized devices that can provide electrical energy to the unmanned vehicle's on-board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device or a hybrid combination of the followings such an electric power supply that is connected to the grid and where the electricity is obtained from fossil fuel power plants, hydroelectric power plants, solar thermal power plants,

nuclear power plants, geothermal power plants,
wind power towers and etc., batteries, or power
devices such as solar cells, photovoltaic
cells, wind generators, hydro-generators,
5 flywheels, stand-alone petrol, diesel, natural
gas, bio-mass fueled gen-sets, thermoelectric
generators, thermo-ionic generators, fuel
cells, internal combustion engines, solar
power, photovoltaic arrays, hydrothermal power,
10 radioisotope or radioactive power systems,
nuclear fission based power generators, thermal
energy conversion devices, Stirling convertors,
Brayton converters, Rankine converters, micro-
miniature dynamic power converters that are
15 integrated with radioisotope heater units,
alpha/beta-voltaic energy conversion devices,
bio-inspired power generation devices, etc.
that are directly connected to the power module
that is connected to the landing platform and
20 deployment system with a smart charging device,

-where the solar cell module(s) have the
capability of staying planar or moving
around a certain axis in order to keep the
surface of the solar cell clean, improve
25 the solar energy collection efficiency,
etc.

-where its additional interfaces allows the
transfer of electrical energy from sources
existing nearby such as a solar farm or a wind
30 farm or any other renewable or un-renewable
power producing devices or power plants,

-where the security or sensing device is a
camera integrated to the Remobox station in

order to monitor the security and maintenance related activities and also providing a virtual-line-of-sight to the unmanned vehicle, to the landing platform and deployment system or to the remote operator such the pilot in order to meet the local aviation regulations,

-where the polarity switch has smart functions and is integrated into one of the modules located within the Remobox station, has multiple states of operation, and enables the safe charging of the unmanned vehicle by controlling the polarity circuitry that is independent from the alignment of the unmanned vehicle on the landing platform,

-where smart charging mechanism is comprised of multiple charging mechanisms (and integrated with a polarity switch with multiple operating) states such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the

landing platform and deployment system,
furthermore the charging mechanisms are
connected to a power module with polarity
switches in order to safely charge
5 unmanned vehicle's the on-board powering
device and also prevent the electrical
shorting of the unmanned vehicle's the on-
board powering device and power module,
the charging mechanism have multiple
10 states of charging depending on the
orientation of the unmanned vehicle after
its landing where it can automatically
sense the polarity of the unmanned
vehicle's battery terminals or the voltage
15 and then open or close the appreciate
switches of the polarity switch in order
to initiate the proper charging without
creating any electrical shorts, completes
the charging and then stops the charging
20 process,

-where the exterior look of the Remobox system
is designed to have a camouflaged texture for
defense applications using the appropriate
color/texture/markings such as green colored
25 exterior or camo textured colored exterior,
etc.,

-where the advanced weather station is
comprised of either single or multiple sensors
that are needed to safely operate the landing
30 platform and deployment system and the unmanned
vehicle in the field, where the sensors are
comprised of a wind direction sensor to
determine the direction of the wind, a wind
speed sensor to determine the speed of the

wind, a temperature sensor to determine the weather temperature, a rain sensor to determine the presence of rain, a humidity sensor to determine the level of humidity present, a pressure sensor to determine the atmospheric pressure, a solar radiation measuring sensor, a disdrometer to monitor the drop size variation, a transmissometer for measuring the visibility around landing platform and deployment system, a UV light measuring sensor, a ceilometer for measuring the cloud ceiling the a hyper-local weather to accurately estimate the local weather conditions, a dew-point measuring sensor, having these sensors being able to self-calibrate themselves, having the wireless or wired communication in order to feed either individual or aggregated sensor data to the unmanned vehicle or landing platform and deployment system or to the remote user,

-where the weather station sensors have their own power modules such batteries, solar cells, photovoltaic cells, or batteries that are charged by solar or photovoltaic cells, or some other power solutions,

-where the solar cell module(s) have the capability of staying planar or moving around a certain axis in order to keep the surface of the solar cell clean, improve the solar energy collection efficiency, etc.

-where the communication/control module is comprised of the essential communication and

control devices that are needed to operate,
manage, monitor all of the functions of the
landing platform and deployment system, the
unmanned vehicle, the integrated power module,
5 smart landing and self-alignment of the unmanned
vehicle, smart charging of the unmanned vehicle,
etc.,

-a weed/plant killer device that is integrated
with an insecticide/pesticide killer device that
10 controls and prevents the undesired vegetation
such as weed, plants, etc., and other small
animals such as ants, spiders, geckos, etc. that
may establish blockage for the operation of the
landing platform and deployment system by
15 covering the externals or creating some sort of
a short-circuiting events within the landing
platform and deployment system or the associated
peripherals,

-where the security sensing device installed to
20 the Remobox station is an anti-theft device or
an anti-tamper device that alerts the owner or
the user of the landing platform and deployment
system, the unmanned vehicle and all the other
associated peripherals for security or safety
25 breach issues,

-where the Remobox station has its own
processing unit to control its own
functionality, the necessary functions of the
unmanned vehicle, the necessary functions of the
30 landing platform and deployment system, and all
the other peripherals for further improved
autonomous operations,

a fence with an active or passive deterring mechanisms
such electrical shocking or some other deterring
mechanisms to maintain the safety of the landing platform
and deployment system, of the unmanned vehicle, and of
5 all the other peripherals of the overall system,
a security device such as an anti-theft device or an
anti-tamper device that notifies the operator for the
situations of security breach related issues,
a passive or an active thermal management device (with
10 cooling and/or heating capability) to enable the thermal
management of the landing platform and deployment system
and thermal management of the Remobox station for
different weather or climate conditions,
a canvas or a sliding cover or a moving cover that covers the
15 landing platform and deployment system for its protection and
also aid in the landing of the unmanned vehicle by protecting
against wind during its landing process,
-where the exterior look of the canvas or sliding cover
or a moving cover is designed to have a camouflaged
20 texture for defense applications using the appropriate
color/texture/markings such as green colored exterior or
camo textured colored exterior, etc.,

28. An alternative embodiment of the unmanned vehicle
25 module's landing and deployment system that is provided in
Claim 26 and comprising of
a landing and deployment system with a landing region
that has precision landing mechanism such as a QR-code-like
code generating device and recessed area and an improved
30 charging mechanisms that are located both on the landing
platform and on the unmanned vehicle,
-where the landing and deployment platform is
comprised of opening/closing doors to align the

landed unmanned vehicle to a pre-determined landing region by using the doors or structures attached to the doors (where the doors are parallel to each other and have the capability of approaching or moving away from each other), a first and second alignment mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable base section (where the base section can move vertically or horizontally depending on the need) for further alignment of the unmanned vehicle to the pre-determined landing region (where the first and second alignment beams/structures are parallel to each other and have the capability of approaching or moving away from each other) and also electrically connecting the unmanned vehicle's on-board charging mechanism to the power module for charging of the on-board powering device of unmanned vehicle, having the landing region with a QR-code-like code by using light illuminating devices and a recessed area (which altogether located on the base section that has a resting seat at its fully rested state) and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and deployment system aiding in the following functions: deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed for the operation of the unmanned vehicle and the associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment

mechanisms, lifting/descending the landing platform,
etc. functions,

5 - where a solar cell module or photovoltaic
module is integrated to the body of the landing
platform and deployment system for generation
of additional electrical energy,

10 -where the solar cell module(s) have the
capability of staying planar or moving
around a certain axis in order to keep the
surface of the solar cell clean, improve
the solar energy collection efficiency,
etc.

15 -where smart charging mechanisms are installed
on the first/second alignment mechanisms via
attachment of charging structures with
electrically insulating materials to further
improve the smart charging mechanism by prevent
electrical hazards that might be surfacing due
to intimate contacts of the first/second
20 alignment mechanisms and the moving mechanisms
existing within the landing platform and
deployment system,

25 -where the landing platform and deployment
system has its own processing unit to control
its own functionality, the necessary functions
of the unmanned vehicle, the necessary
functions of the Remobox station, and all the
other peripherals for further improved
autonomous operations,

30 -where the a QR-code-like code by using light
illuminating devices are used to generate a
specific code to aid in the precision landing
of the unmanned vehicle and this can be
achieved by using the LED-light like devices in

their multiple numbers with a control that turns on/off certain lights in order to generate a very specific pattern that would resemble a QR code,

5 -where the exterior look of the landing and deployment system is designed to have the theme of a smart city concept using the appropriate color/texture/markings such as white-to-gray background color with gray text color and blue

10 partial-text coloring for Singapore, etc., an unmanned vehicle with its sensing devices and integrated charging elements and rolling elements attached to its body,

-where the sensing device is a camera to visually

15 detect the QR-code-like code that is generated on the landing platform for unmanned vehicle's precision landing functionality,

-where the unmanned vehicle has its on-board rolling elements such as rolling balls or rolling-element

20 bearing that are integrated into its landing gears such as legs for its easy self-alignment during the alignment process,

-where the rolling elements integrated to the body of the unmanned vehicle places themselves

25 into the recessed area of the landing platform for preventing of the accidental or unintentional skidding off of the unmanned vehicle from the landing platform during abnormal weathers,

30 -where the rolling elements that are attached to the unmanned vehicle's body are electrically isolated from the unmanned vehicle's and landing platform and deployment system's charging mechanisms to

prevent electrical hazards to other
peripherals,

-where the unmanned vehicle's charging elements are
integrated into the body of the unmanned vehicle for
5 its easy contact to the charging mechanism located on
the landing platform and deployment system

-where the unmanned charging elements are made
of electrically conductive elements such as
aluminum, copper, or any other relevant and
10 electrically conductive materials (including
the electrically conductive plastics, polymers,
composites, ceramics, etc.) and establishing
the electrical contact with the charging plates
by physically touching each other,

15 -where the unmanned vehicle's on-board powering
device is electrically connected to its on-board
charging elements with wires, cables, etc. in order
to transfer the electrical energy from the power
module,

20 -where the exterior look of the unmanned
vehicle is designed to have the theme of a
smart city concept using the appropriate
color/texture/markings such as white-to-gray
background color with gray text color and blue
25 partial-text coloring for Singapore, etc.,

a smart charging mechanism,

-where there exists multiple charging mechanisms such
as one of the charging mechanism being located on the
landing platform and deployment system and the second
30 one being located on-board of the unmanned vehicle,
where the first charging mechanism allows the
electrical contact to be made between the power
module and the charging elements integrated into the
body of the unmanned vehicle via metallic contacts of

the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

an integrated remote box station (also known as Remobox) that provides a complete power and sensing solutions including security of the station, and also have additional interfaces to receive electricity from multiple different sources for the landing platform and deployment system and for the unmanned vehicle,

-where the Remobox station is comprised of standalone power modules such as fuel cell systems, batteries, or other powering devices, have the capability of receiving electrical energy from multiple different sources in its vicinity, a security or sensing device such as a camera, a polarity switch (also known as switchable

rectifier), and advanced weather station, a communication/control module, a weed/plant killer integrated with an insecticide/pesticide killer device, a communication device such as an antenna, and a source of renewable power such as solar cells or photovoltaic cells module,

-where the power modules are either standalone or hybridized devices that can provide electrical energy to the unmanned vehicle's on-board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device or a hybrid combination of the followings such an electric power supply that is connected to the grid and where the electricity is obtained from fossil fuel power plants, hydroelectric power plants, solar thermal power plants, nuclear power plants, geothermal power plants, wind power towers and etc., batteries, or power devices such as solar cells, photovoltaic cells, wind generators, hydro-generators, flywheels, stand-alone petrol, diesel, natural gas, bio-mass fueled gen-sets, thermoelectric generators, thermo-ionic generators, fuel cells, internal combustion engines, solar power, photovoltaic arrays, hydrothermal power, radioisotope or radioactive power systems, nuclear fission based power generators, thermal energy conversion devices, Stirling convertors, Brayton converters, Rankine converters, micro-miniature dynamic power converters that are integrated with radioisotope heater units, alpha/beta-voltaic energy conversion devices,

bio-inspired power generation devices, etc.
that are directly connected to the power module
that is connected to the landing platform and
deployment system with a smart charging device,

5 -where the solar cell module(s) have the
 capability of staying planar or moving
 around a certain axis in order to keep the
 surface of the solar cell clean, improve
 the solar energy collection efficiency,
10 etc.

 -where its additional interfaces allows the
 transfer of electrical energy from sources
 existing nearby such as a solar farm or a wind
 farm or any other renewable or un-renewable
15 power producing devices or power plants,

 -where the security or sensing device is a
 camera integrated to the Remobox station in
 order to monitor the security and maintenance
 related activities and also providing a virtual-
20 line-of-sight to the unmanned vehicle, to the
 landing platform and deployment system or to the
 remote operator such the pilot in order to meet
 the local aviation regulations,

 -where the polarity switch has smart functions
25 and is integrated into one of the modules
 located within the Remobox station, has multiple
 states of operation, and enables the safe
 charging of the unmanned vehicle by controlling
 the polarity circuitry that is independent from
30 the alignment of the unmanned vehicle on the
 landing platform,

-where smart charging mechanism is
comprised of multiple charging mechanisms
(and integrated with a polarity switch
with multiple operating) states such as
5 one of the charging mechanism being
located on the landing platform and
deployment system and the second one being
located on-board of the unmanned vehicle,
where the first charging mechanism allows
10 the electrical contact to be made between
the power module and the charging elements
integrated into the body of the unmanned
vehicle via metallic contacts of the
first/second alignment mechanisms, and the
15 second charging mechanism that is located
on-board of the unmanned vehicle that
enables the electrical connection be made
between the on-board powering device and
the charging mechanism located on the
20 landing platform and deployment system,
furthermore the charging mechanisms are
connected to a power module with polarity
switches in order to safely charge
unmanned vehicle's the on-board powering
25 device and also prevent the electrical
shorting of the unmanned vehicle's the on-
board powering device and power module,
the charging mechanism have multiple
states of charging depending on the
30 orientation of the unmanned vehicle after
its landing where it can automatically
sense the polarity of the unmanned
vehicle's battery terminals or the voltage
and then open or close the appreciate

switches of the polarity switch in order
to initiate the proper charging without
creating any electrical shorts, completes
the charging and then stops the charging
5 process,

-where the exterior look of the Remobox system
is designed to have the theme of a smart city
concept using the appropriate
color/texture/markings such as white-to-gray
10 background color with gray text color and blue
partial-text coloring for Singapore, etc.,

-where the advanced weather station is
comprised of either single or multiple sensors
that are needed to safely operate the landing
15 platform and deployment system and the unmanned
vehicle in the field, where the sensors are
comprised of a wind direction sensor to
determine the direction of the wind, a wind
speed sensor to determine the speed of the
20 wind, a temperature sensor to determine the
weather temperature, a rain sensor to determine
the presence of rain, a humidity sensor to
determine the level of humidity present, a
pressure sensor to determine the atmospheric
25 pressure, a solar radiation measuring sensor, a
disdrometer to monitor the drop size variation,
a transmissometer for measuring the visibility
around landing platform and deployment system,
a UV light measuring sensor, a ceilometer for
30 measuring the cloud ceiling the a hyper-local
weather to accurately estimate the local
weather conditions, a dew-point measuring
sensor, having these sensors being able to
self-calibrate themselves, having the wireless

or wired communication in order to feed either individual or aggregated sensor data to the unmanned vehicle or landing platform and deployment system or to the remote user,

5 -where the weather station sensors have their own power modules such batteries, solar cells, photovoltaic cells, or batteries that are charged by solar or photovoltaic cells, or some other power
10 solutions,

 -where the solar cell module(s) have the capability of staying planar or moving around a certain axis in order to keep the surface of the solar cell
15 clean, improve the solar energy collection efficiency, etc.

-where the communication/control module is comprised of the essential communication and control devices that are needed to operate,
20 manage, monitor all of the functions of the landing platform and deployment system, the unmanned vehicle, the integrated power module, smart landing and self-alignment of the unmanned vehicle, smart charging of the unmanned vehicle,
25 etc.,

-a weed/plant killer device that is integrated with an insecticide/pesticide killer device that controls and prevents the undesired vegetation such as weed, plants, etc., and other small
30 animals such as ants, spiders, geckos, etc. that may establish blockage for the operation of the landing platform and deployment system by covering the externals or creating some sort of

a short-circuiting events within the landing platform and deployment system or the associated peripherals,

5 -where the security sensing device installed to the Remobox station is an anti-theft device or an anti-tamper device that alerts the owner or the user of the landing platform and deployment system, the unmanned vehicle and all the other associated peripherals for security or safety
10 breach issues,

 -where the Remobox station has its own processing unit to control its own functionality, the necessary functions of the unmanned vehicle, the necessary functions of the
15 landing platform and deployment system, and all the other peripherals for further improved autonomous operations,

 a fence with an active or passive deterring mechanisms such electrical shocking or some other deterring
20 mechanisms to maintain the safety of the landing platform and deployment system, of the unmanned vehicle, and of all the other peripherals of the overall system,

 a security device such as an anti-theft device or an anti-tamper device that notifies the operator for the
25 situations of security breach related issues,

 a passive or an active thermal management device (with cooling and/or heating capability) to enable the thermal management of the landing platform and deployment system and thermal management of the Remobox station for
30 different weather or climate conditions,

 a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its protection and

also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,

5 -where the exterior look of the canvas or sliding cover or a moving cover is designed to have the theme of a smart city concept using the appropriate color/texture/markings such as white-to-gray background color with gray text color and blue partial-text coloring for Singapore, etc.,

10 29. An alternative embodiment of the unmanned vehicle module's landing and deployment system that is provided in Claim 26 and comprising of

15 a landing and deployment system with a landing region that has precision landing mechanism such as a QR-code-like code generating device and recessed area and an improved charging mechanisms that are located both on the landing platform and on the unmanned vehicle,

20 -where the landing and deployment platform is comprised of opening/closing doors to align the landed unmanned vehicle to a pre-determined landing region by using the doors or structures attached to the doors (where the doors are parallel to each other and have the capability of approaching or moving away from each other), a first and second alignment mechanisms (which is orthogonal to the opening/closing doors) that is located on a moveable base section (where the base section can move vertically or horizontally depending on the need) for further alignment of the unmanned vehicle to the pre-determined landing region (where the first and second alignment beams/structures are parallel to each other and have the capability of approaching or moving away from each other) and also electrically connecting the unmanned vehicle's on-board charging mechanism to the

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power module for charging of the on-board powering device of unmanned vehicle, having the landing region with a QR-code-like code by using light illuminating devices and a recessed area (which altogether located

5 on the base section that has a resting seat at its fully rested state) and a camera located on the unmanned vehicle to detect this QR code for its precision landing, having the landing platform and deployment system aiding in the following functions:

10 deployment of the unmanned vehicle, receiving and landing of the unmanned vehicle, storage of the unmanned vehicle, charging of the unmanned vehicle, and other essential functionalities that are needed for the operation of the unmanned vehicle and the

15 associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment mechanisms, lifting/descending the landing platform,

20 etc. functions,

- where a solar cell module or photovoltaic module is integrated to the body of the landing platform and deployment system for generation of additional electrical energy,

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- where the solar cell module(s) have the capability of staying planar or moving around a certain axis in order to keep the surface of the solar cell clean, improve the solar energy collection efficiency,

30

- etc.
- where smart charging mechanisms are installed on the first/second alignment mechanisms via attachment of charging structures with electrically insulating materials to further

improve the smart charging mechanism by prevent
electrical hazards that might be surfacing due
to intimate contacts of the first/second
alignment mechanisms and the moving mechanisms
5 existing within the landing platform and
deployment system,
-where the landing platform and deployment
system has its own processing unit to control
its own functionality, the necessary functions
10 of the unmanned vehicle, the necessary
functions of the Remobox station, and all the
other peripherals for further improved
autonomous operations,
-where the a QR-code-like code by using light
15 illuminating devices are used to generate a
specific code to aid in the precision landing
of the unmanned vehicle and this can be
achieved by using the LED-light like devices in
their multiple numbers with a control that
20 turns on/off certain lights in order to
generate a very specific pattern that would
resemble a QR code,
-where the exterior look of the landing and
deployment system is designed to have the theme
25 relevant to a construction-site concept using
the appropriate color/texture/markings such as
orange or yellow background color with properly
angled black and orange or yellow stripes,
etc.,
30 an unmanned vehicle with its sensing devices and
integrated charging elements and rolling elements
attached to its body,
-where the sensing device is a camera to visually
detect the QR-code-like code that is generated on the

landing platform for unmanned vehicle's precision
landing functionality,

-where the unmanned vehicle has its on-board rolling
elements such as rolling balls or rolling-element
5 bearing that are integrated into its landing gears
such as legs for its easy self-alignment during the
alignment process,

-where the rolling elements integrated to the
body of the unmanned vehicle places themselves
10 into the recessed area of the landing platform
for preventing of the accidental or
unintentional skidding off of the unmanned
vehicle from the landing platform during
abnormal weathers,

-where the rolling elements that are
15 attached to the unmanned vehicle's body are
electrically isolated from the unmanned
vehicle's and landing platform and
deployment system's charging mechanisms to
20 prevent electrical hazards to other
peripherals,

-where the unmanned vehicle's charging elements are
integrated into the body of the unmanned vehicle for
its easy contact to the charging mechanism located on
25 the landing platform and deployment system

-where the unmanned charging elements are made
of electrically conductive elements such as
aluminum, copper, or any other relevant and
electrically conductive materials (including
30 the electrically conductive plastics, polymers,
composites, ceramics, etc.) and establishing
the electrical contact with the charging plates
by physically touching each other,

-where the unmanned vehicle's on-board powering device is electrically connected to its on-board charging elements with wires, cables, etc. in order to transfer the electrical energy from the power module,

5 -where the exterior look of the unmanned vehicle is designed to have the theme relevant to a construction-site concept using the appropriate color/texture/markings such as orange or yellow background color with properly angled black and orange or yellow stripes,

10 a smart charging mechanism,

 -where there exists multiple charging mechanisms such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle,

15 where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing

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where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

an integrated remote box station (also known as Remobox) that provides a complete power and sensing solutions including security of the station, and also have additional interfaces to receive electricity from multiple different sources for the landing platform and deployment system and for the unmanned vehicle,

-where the Remobox station is comprised of standalone power modules such as fuel cell systems, batteries, or other powering devices, have the capability of receiving electrical energy from multiple different sources in its vicinity, a security or sensing device such as a camera, a polarity switch (also known as switchable rectifier), and advanced weather station, a communication/control module, a weed/plant killer integrated with an insecticide/pesticide killer device, a communication device such as an antenna, and a source of renewable power such as solar cells or photovoltaic cells module,

-where the power modules are either standalone or hybridized devices that can provide electrical energy to the unmanned vehicle's on-board powering device via polarity switch and charging mechanisms installed on the landing platform and deployment system and on the unmanned vehicle and can be a standalone device

or a hybrid combination of the followings such
an electric power supply that is connected to
the grid and where the electricity is obtained
from fossil fuel power plants, hydroelectric
5 power plants, solar thermal power plants,
nuclear power plants, geothermal power plants,
wind power towers and etc., batteries, or power
devices such as solar cells, photovoltaic
cells, wind generators, hydro-generators,
10 flywheels, stand-alone petrol, diesel, natural
gas, bio-mass fueled gen-sets, thermoelectric
generators, thermo-ionic generators, fuel
cells, internal combustion engines, solar
power, photovoltaic arrays, hydrothermal power,
15 radioisotope or radioactive power systems,
nuclear fission based power generators, thermal
energy conversion devices, Stirling convertors,
Brayton converters, Rankine converters, micro-
miniature dynamic power converters that are
20 integrated with radioisotope heater units,
alpha/beta-voltaic energy conversion devices,
bio-inspired power generation devices, etc.
that are directly connected to the power module
that is connected to the landing platform and
25 deployment system with a smart charging device,

-where the solar cell module(s) have the
capability of staying planar or moving
around a certain axis in order to keep the
surface of the solar cell clean, improve
30 the solar energy collection efficiency,
etc.

-where its additional interfaces allows the
transfer of electrical energy from sources

existing nearby such as a solar farm or a wind farm or any other renewable or un-renewable power producing devices or power plants,

5 -where the security or sensing device is a camera integrated to the Remobox station in order to monitor the security and maintenance related activities and also providing a virtual-line-of-sight to the unmanned vehicle, to the landing platform and deployment system or to the
10 remote operator such the pilot in order to meet the local aviation regulations,

 -where the polarity switch has smart functions and is integrated into one of the modules located within the Remobox station, has multiple
15 states of operation, and enables the safe charging of the unmanned vehicle by controlling the polarity circuitry that is independent from the alignment of the unmanned vehicle on the landing platform,

20 -where smart charging mechanism is comprised of multiple charging mechanisms (and integrated with a polarity switch with multiple operating) states such as one of the charging mechanism being
25 located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between
30 the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the

second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

-where the exterior look of the Remobox system is designed to have the theme relevant to a construction-site concept using the appropriate color/texture/markings such as orange or yellow background color with properly angled black and orange or yellow stripes,

-where the advanced weather station is comprised of either single or multiple sensors that are needed to safely operate the landing

platform and deployment system and the unmanned vehicle in the field, where the sensors are comprised of a wind direction sensor to determine the direction of the wind, a wind speed sensor to determine the speed of the wind, a temperature sensor to determine the weather temperature, a rain sensor to determine the presence of rain, a humidity sensor to determine the level of humidity present, a pressure sensor to determine the atmospheric pressure, a solar radiation measuring sensor, a disdrometer to monitor the drop size variation, a transmissometer for measuring the visibility around landing platform and deployment system, a UV light measuring sensor, a ceilometer for measuring the cloud ceiling the a hyper-local weather to accurately estimate the local weather conditions, a dew-point measuring sensor, having these sensors being able to self-calibrate themselves, having the wireless or wired communication in order to feed either individual or aggregated sensor data to the unmanned vehicle or landing platform and deployment system or to the remote user,

25 -where the weather station sensors have their own power modules such batteries, solar cells, photovoltaic cells, or batteries that are charged by solar or photovoltaic cells, or some other power solutions,

30 -where the solar cell module(s) have the capability of staying planar or moving around a certain axis in order

to keep the surface of the solar cell
clean, improve the solar energy
collection efficiency, etc.

5 -where the communication/control module is
comprised of the essential communication and
control devices that are needed to operate,
manage, monitor all of the functions of the
landing platform and deployment system, the
unmanned vehicle, the integrated power module,
10 smart landing and self-alignment of the unmanned
vehicle, smart charging of the unmanned vehicle,
etc.,

 -a weed/plant killer device that is integrated
with an insecticide/pesticide killer device that
15 controls and prevents the undesired vegetation
such as weed, plants, etc., and other small
animals such as ants, spiders, geckos, etc. that
may establish blockage for the operation of the
landing platform and deployment system by
20 covering the externals or creating some sort of
a short-circuiting events within the landing
platform and deployment system or the associated
peripherals,

 -where the security sensing device installed to
25 the Remobox station is an anti-theft device or
an anti-tamper device that alerts the owner or
the user of the landing platform and deployment
system, the unmanned vehicle and all the other
associated peripherals for security or safety
30 breach issues,

 -where the Remobox station has its own
processing unit to control its own
functionality, the necessary functions of the

unmanned vehicle, the necessary functions of the landing platform and deployment system, and all the other peripherals for further improved autonomous operations,

- 5 a fence with an active or passive deterring mechanisms such electrical shocking or some other deterring mechanisms to maintain the safety of the landing platform and deployment system, of the unmanned vehicle, and of all the other peripherals of the overall system,
- 10 a security device such as an anti-theft device or an anti-tamper device that notifies the operator for the situations of security breach related issues,
- a passive or an active thermal management device (with cooling and/or heating capability) to enable the thermal
- 15 management of the landing platform and deployment system and thermal management of the Remobox station for different weather or climate conditions,
- a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its protection and
- 20 also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,
- where the exterior look of the canvas or sliding cover or a moving cover is designed to have the theme relevant to a construction-site concept using the appropriate
- 25 color/texture/markings such as orange or yellow background color with properly angled black and orange or yellow stripes, etc.,
30. An alternative embodiment of the unmanned vehicle
- 30 module's landing and deployment system that is provided in Claim 26 and comprising of
- a landing and deployment system with a landing region that has precision landing mechanism such as a QR-code-like

code generating device and recessed area and an improved charging mechanisms that are located both on the landing platform and on the unmanned vehicle,

5 -where the landing and deployment platform is
comprised of opening/closing doors to align the
landed unmanned vehicle to a pre-determined landing
region by using the doors or structures attached to
the doors (where the doors are parallel to each other
and have the capability of approaching or moving away
10 from each other), a first and second alignment
mechanisms (which is orthogonal to the
opening/closing doors) that is located on a moveable
base section (where the base section can move
vertically or horizontally depending on the need) for
15 further alignment of the unmanned vehicle to the pre-
determined landing region (where the first and second
alignment beams/structures are parallel to each other
and have the capability of approaching or moving away
from each other) and also electrically connecting the
20 unmanned vehicle's on-board charging mechanism to the
power module for charging of the on-board powering
device of unmanned vehicle, having the landing region
with a QR-code-like code by using light illuminating
devices and a recessed area (which altogether located
25 on the base section that has a resting seat at its
fully rested state) and a camera located on the
unmanned vehicle to detect this QR code for its
precision landing, having the landing platform and
deployment system aiding in the following functions:
30 deployment of the unmanned vehicle, receiving and
landing of the unmanned vehicle, storage of the
unmanned vehicle, charging of the unmanned vehicle,
and other essential functionalities that are needed
for the operation of the unmanned vehicle and the

associated peripherals, motors, switches, linear transmission mechanisms, sensors, guiding rails, and other essential peripherals needed to open/close doors, move the first and second alignment mechanisms, lifting/descending the landing platform, etc. functions,

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- where a solar cell module or photovoltaic module is integrated to the body of the landing platform and deployment system for generation of additional electrical energy,

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-where the solar cell module(s) have the capability of staying planar or moving around a certain axis in order to keep the surface of the solar cell clean, improve the solar energy collection efficiency,

15

etc.

-where smart charging mechanisms are installed on the first/second alignment mechanisms via attachment of charging structures with electrically insulating materials to further improve the smart charging mechanism by prevent electrical hazards that might be surfacing due to intimate contacts of the first/second alignment mechanisms and the moving mechanisms existing within the landing platform and deployment system,

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-where the landing platform and deployment system has its own processing unit to control its own functionality, the necessary functions of the unmanned vehicle, the necessary functions of the Remobox station, and all the other peripherals for further improved autonomous operations,

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- 5 -where the a QR-code-like code by using light
 illuminating devices are used to generate a
 specific code to aid in the precision landing
 of the unmanned vehicle and this can be
 achieved by using the LED-light like devices in
 their multiple numbers with a control that
 turns on/off certain lights in order to
 generate a very specific pattern that would
 resemble a QR code,
- 10 -where the exterior look of the landing and
 deployment system is designed to have the theme
 relevant to a certain locality using the
 appropriate color/texture/markings such as
 having sand colored exterior for desert areas
15 such as a locality in Africa or forestry
 colored exterior for a particular city in the
 vicinity of jungles, etc.,
- an unmanned vehicle with its sensing devices and
 integrated charging elements and rolling elements
20 attached to its body,
- where the sensing device is a camera to visually
 detect the QR-code-like code that is generated on the
 landing platform for unmanned vehicle's precision
 landing functionality,
- 25 -where the unmanned vehicle has its on-board rolling
 elements such as rolling balls or rolling-element
 bearing that are integrated into its landing gears
 such as legs for its easy self-alignment during the
 alignment process,
- 30 -where the rolling elements integrated to the
 body of the unmanned vehicle places themselves
 into the recessed area of the landing platform
 for preventing of the accidental or
 unintentional skidding off of the unmanned

vehicle from the landing platform during
abnormal weathers,

5 -where the rolling elements that are
 attached to the unmanned vehicle's body are
 electrically isolated from the unmanned
 vehicle's and landing platform and
 deployment system's charging mechanisms to
 prevent electrical hazards to other
 peripherals,

10 -where the unmanned vehicle's charging elements are
 integrated into the body of the unmanned vehicle for
 its easy contact to the charging mechanism located on
 the landing platform and deployment system

15 -where the unmanned charging elements are made
 of electrically conductive elements such as
 aluminum, copper, or any other relevant and
 electrically conductive materials (including
 the electrically conductive plastics, polymers,
20 composites, ceramics, etc.) and establishing
 the electrical contact with the charging plates
 by physically touching each other,

 -where the unmanned vehicle's on-board powering
 device is electrically connected to its on-board
 charging elements with wires, cables, etc. in order
25 to transfer the electrical energy from the power
 module,

 -where the exterior look of the unmanned
 vehicle is designed to have the theme relevant
 to a certain locality using the appropriate
30 color/texture/markings such as having sand
 colored exterior for desert areas such as a
 locality in Africa or forestry colored exterior
 for a particular city in the vicinity of
 jungles, etc.,

a smart charging mechanism,

-where there exists multiple charging mechanisms such as one of the charging mechanism being located on the landing platform and deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-board powering device and power module, the charging mechanism have multiple states of charging depending on the orientation of the unmanned vehicle after its landing where it can automatically sense the polarity of the unmanned vehicle's battery terminals or the voltage and then open or close the appreciate switches of the polarity switch in order to initiate the proper charging without creating any electrical shorts, completes the charging and then stops the charging process,

an integrated remote box station (also known as Remobox) that provides a complete power and sensing solutions including security of the station, and also have additional interfaces to receive electricity from

multiple different sources for the landing platform and deployment system and for the unmanned vehicle,

5 -where the Remobox station is comprised of
standalone power modules such as fuel cell systems,
batteries, or other powering devices, have the
capability of receiving electrical energy from
multiple different sources in its vicinity, a
security or sensing device such as a camera, a
polarity switch (also known as switchable
10 rectifier), and advanced weather station, a
communication/control module, a weed/plant killer
integrated with an insecticide/pesticide killer
device, a communication device such as an antenna,
and a source of renewable power such as solar cells
15 or photovoltaic cells module,

 -where the power modules are either standalone
or hybridized devices that can provide
electrical energy to the unmanned vehicle's on-
board powering device via polarity switch and
20 charging mechanisms installed on the landing
platform and deployment system and on the
unmanned vehicle and can be a standalone device
or a hybrid combination of the followings such
an electric power supply that is connected to
25 the grid and where the electricity is obtained
from fossil fuel power plants, hydroelectric
power plants, solar thermal power plants,
nuclear power plants, geothermal power plants,
wind power towers and etc., batteries, or power
30 devices such as solar cells, photovoltaic
cells, wind generators, hydro-generators,
flywheels, stand-alone petrol, diesel, natural
gas, bio-mass fueled gen-sets, thermoelectric

generators, thermo-ionic generators, fuel cells, internal combustion engines, solar power, photovoltaic arrays, hydrothermal power, radioisotope or radioactive power systems, nuclear fission based power generators, thermal energy conversion devices, Stirling convertors, Brayton converters, Rankine converters, micro-miniature dynamic power converters that are integrated with radioisotope heater units, alpha/beta-voltaic energy conversion devices, bio-inspired power generation devices, etc. that are directly connected to the power module that is connected to the landing platform and deployment system with a smart charging device,

-where the solar cell module(s) have the capability of staying planar or moving around a certain axis in order to keep the surface of the solar cell clean, improve the solar energy collection efficiency, etc.

-where its additional interfaces allows the transfer of electrical energy from sources existing nearby such as a solar farm or a wind farm or any other renewable or un-renewable power producing devices or power plants,

-where the security or sensing device is a camera integrated to the Remobox station in order to monitor the security and maintenance related activities and also providing a virtual-line-of-sight to the unmanned vehicle, to the landing platform and deployment system or to the remote operator such the pilot in order to meet the local aviation regulations,

-where the polarity switch has smart functions and is integrated into one of the modules located within the Remobox station, has multiple states of operation, and enables the safe
5 charging of the unmanned vehicle by controlling the polarity circuitry that is independent from the alignment of the unmanned vehicle on the landing platform,

-where smart charging mechanism is
10 comprised of multiple charging mechanisms (and integrated with a polarity switch with multiple operating) states such as one of the charging mechanism being located on the landing platform and
15 deployment system and the second one being located on-board of the unmanned vehicle, where the first charging mechanism allows the electrical contact to be made between the power module and the charging elements
20 integrated into the body of the unmanned vehicle via metallic contacts of the first/second alignment mechanisms, and the second charging mechanism that is located on-board of the unmanned vehicle that
25 enables the electrical connection be made between the on-board powering device and the charging mechanism located on the landing platform and deployment system, furthermore the charging mechanisms are
30 connected to a power module with polarity switches in order to safely charge unmanned vehicle's the on-board powering device and also prevent the electrical shorting of the unmanned vehicle's the on-

board powering device and power module,
the charging mechanism have multiple
states of charging depending on the
orientation of the unmanned vehicle after
5 its landing where it can automatically
sense the polarity of the unmanned
vehicle's battery terminals or the voltage
and then open or close the appreciate
switches of the polarity switch in order
10 to initiate the proper charging without
creating any electrical shorts, completes
the charging and then stops the charging
process,

-where the exterior look of the Remobox system
15 is designed to have the theme relevant to a
certain locality using the appropriate
color/texture/markings such as having sand
colored exterior for desert areas such as a
locality in Africa or forestry colored exterior
20 for a particular city in the vicinity of
jungles, etc.,

-where the advanced weather station is
comprised of either single or multiple sensors
that are needed to safely operate the landing
25 platform and deployment system and the unmanned
vehicle in the field, where the sensors are
comprised of a wind direction sensor to
determine the direction of the wind, a wind
speed sensor to determine the speed of the
30 wind, a temperature sensor to determine the
weather temperature, a rain sensor to determine
the presence of rain, a humidity sensor to
determine the level of humidity present, a
pressure sensor to determine the atmospheric

pressure, a solar radiation measuring sensor, a
disdrometer to monitor the drop size variation,
a transmissometer for measuring the visibility
around landing platform and deployment system,
5 a UV light measuring sensor, a ceilometer for
measuring the cloud ceiling the a hyper-local
weather to accurately estimate the local
weather conditions, a dew-point measuring
sensor, having these sensors being able to
10 self-calibrate themselves, having the wireless
or wired communication in order to feed either
individual or aggregated sensor data to the
unmanned vehicle or landing platform and
deployment system or to the remote user,

15 -where the weather station sensors have
their own power modules such batteries,
solar cells, photovoltaic cells, or
batteries that are charged by solar or
photovoltaic cells, or some other power
20 solutions,

-where the solar cell module(s) have
the capability of staying planar or
moving around a certain axis in order
to keep the surface of the solar cell
25 clean, improve the solar energy
collection efficiency, etc.

-where the communication/control module is
comprised of the essential communication and
control devices that are needed to operate,
30 manage, monitor all of the functions of the
landing platform and deployment system, the
unmanned vehicle, the integrated power module,
smart landing and self-alignment of the unmanned

vehicle, smart charging of the unmanned vehicle,
etc.,

5 -a weed/plant killer device that is integrated
with an insecticide/pesticide killer device that
controls and prevents the undesired vegetation
such as weed, plants, etc., and other small
animals such as ants, spiders, geckos, etc. that
may establish blockage for the operation of the
landing platform and deployment system by
10 covering the externals or creating some sort of
a short-circuiting events within the landing
platform and deployment system or the associated
peripherals,

15 -where the security sensing device installed to
the Remobox station is an anti-theft device or
an anti-tamper device that alerts the owner or
the user of the landing platform and deployment
system, the unmanned vehicle and all the other
associated peripherals for security or safety
20 breach issues,

 -where the Remobox station has its own
processing unit to control its own
functionality, the necessary functions of the
unmanned vehicle, the necessary functions of the
25 landing platform and deployment system, and all
the other peripherals for further improved
autonomous operations,

30 a fence with an active or passive deterring mechanisms
such electrical shocking or some other deterring
mechanisms to maintain the safety of the landing platform
and deployment system, of the unmanned vehicle, and of
all the other peripherals of the overall system,

a security device such as an anti-theft device or an anti-tamper device that notifies the operator for the situations of security breach related issues,

5 a passive or an active thermal management device (with cooling and/or heating capability) to enable the thermal management of the landing platform and deployment system and thermal management of the Remobox station for different weather or climate conditions,

10 a canvas or a sliding cover or a moving cover that covers the landing platform and deployment system for its protection and also aid in the landing of the unmanned vehicle by protecting against wind during its landing process,

15 -where the exterior look of the canvas or sliding cover or a moving cover is designed to have the theme relevant to a certain locality using the appropriate color/texture/markings such as having sand colored exterior for desert areas such as a locality in Africa or forestry colored exterior for a particular city in the vicinity of jungles, etc.,

20