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27189
PROCOPIO, CORY, HARGREAVES & SAVITCH LLP
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SUITE 2200
SAN DIEGO, CA 92101

CONFIRMATION NO. 9901
FILING RECEIPT



Date Mailed: 06/25/2015

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

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Applicant(s)

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Power of Attorney:

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Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

**** MICRO ENTITY ****

Title

Low altitude aircraft identification system

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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CERTIFICATION OF MICRO ENTITY STATUS (GROSS INCOME BASIS)					
Application Number or Control Number (if applicable):			Patent Number (if applicable):		
First Named Inventor: Aislan Gomide Foina			Title of Invention: A low altitude aircraft identification system		
The applicant hereby certifies the following—					
(1) SMALL ENTITY REQUIREMENT – The applicant qualifies as a small entity as defined in 37 CFR 1.27. (2) APPLICATION FILING LIMIT – Neither the applicant nor the inventor nor a joint inventor has been named as the inventor or a joint inventor on more than four previously filed U.S. patent applications, excluding provisional applications and international applications under the Patent Cooperation Treaty (PCT) for which the basic national fee under 37 CFR 1.492(a) was not paid, and also excluding patent applications for which the applicant has assigned all ownership rights, or is obligated to assign all ownership rights, as a result of the applicant's previous employment. (3) GROSS INCOME LIMIT ON APPLICANTS AND INVENTORS – Neither the applicant nor the inventor nor a joint inventor, in the calendar year preceding the calendar year in which the applicable fee is being paid, had a gross income, as defined in section 61(a) of the Internal Revenue Code of 1986 (26 U.S.C. 61(a)), exceeding the "Maximum Qualifying Gross Income" reported on the USPTO Web site at http://www.uspto.gov/patents/law/micro_entity.jsp which is equal to three times the median household income for that preceding calendar year, as most recently reported by the Bureau of the Census. (4) GROSS INCOME LIMIT ON PARTIES WITH AN "OWNERSHIP INTEREST" – Neither the applicant nor the inventor nor a joint inventor has assigned, granted, or conveyed, nor is under an obligation by contract or law to assign, grant, or convey, a license or other ownership interest in the application concerned to an entity that, in the calendar year preceding the calendar year in which the applicable fee is being paid, had a gross income, as defined in section 61(a) of the Internal Revenue Code of 1986, exceeding the "Maximum Qualifying Gross Income" reported on the USPTO Web site at http://www.uspto.gov/patents/law/micro_entity.jsp which is equal to three times the median household income for that preceding calendar year, as most recently reported by the Bureau of the Census.					
SIGNATURE by an authorized party set forth in 37 CFR 1.33(b)					
Signature		/Ernest C. Huang/			
Name		Ernest C Huang			
Date		June 12, 2015	Telephone	650-645-9000	Registration No. 60083
☐		There is more than one inventor and I am one of the inventors who are jointly identified as the applicant. The required additional certification form(s) signed by the other joint inventor(s) are included with this form.			

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1

Remove

Given Name

Middle Name

Family Name

City

State

Country i

Aislan

Gomide

Foina

El Cerrito

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Inventor 2

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Sengupta

El Cerrito

CA

US

All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.

Add

Title of Invention

A low altitude aircraft identification system

Attorney Docket Number (if applicable)

Correspondence Address

Direct all correspondence to (select one):

☒ The address corresponding to Customer Number

☐ Firm or Individual Name

Customer Number

27189

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

☐ Yes, the invention was made by an agency of the United States Government. The U.S. Government agency name is:

☐ Yes, the invention was under a contract with an agency of the United States Government. The name of the U.S. Government agency and Government contract number are:

Entity Status**Applicant asserts small entity status under 37 CFR 1.27 or applicant certifies micro entity status under 37 CFR 1.29**

- ☐ Applicant asserts small entity status under 37 CFR 1.27
- ☒ Applicant certifies micro entity status under 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
- ☐ No

Warning

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Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Ernest C. Huang/			Date (YYYY-MM-DD)	2015-06-12
First Name	Ernest C.	Last Name	Huang	Registration Number (If appropriate)	60083

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Invention Title

A low altitude aircraft identification system

Background of the Invention

The related art unmanned aerial vehicles (UAV) or unmanned aircraft system (UAS) markets, which once belonged to professional companies, now has many amateur pilots flying affordable models available in electronic stores and controlled by smartphones. Due to their altitude, speed, and weight, these flying objects can cause damage and injuries. Because of this, a system to manage these vehicles is necessary.

Consider the automotive industry: one of the bases of the car control system, like Department of Motor Vehicles (DMV), is the license plate. Analogously, the UAS industry needs an identification system, specifically for small UASs. These aircrafts, weighing up to 25 pounds and flying up to 500 feet of the low altitude airspace, are too small to utilize the large, commercially used, related art tail numbers that other vehicles could use. An identification solution is needed. This solution must allow the vehicle to be identified by people on the ground and by other aircrafts. It must also allow external devices to identify the vehicles in an automated way.

The present innovative solution is a system of three components: an identification box attached to the aircrafts (i.e., the “license plate”); a device to be used on the ground to automatically capture the identification code; and a server to store the aircraft data

Brief Summary of the Present Invention

The present invention describes an aircraft identification system with three components: an aircraft electronic identification box with an embedded logger; a ground identification device to identify the aircraft by just pointing at it; and a server to store and manage the aircraft information.

Electronic Identification Box

A traffic management system must monitor the traffic and notify the responsible party in case of any non-compliance with a regulation. Therefore, to identify the responsible party, the system must identify the vehicle. The ground traffic management system requires all vehicles to have a license plate for driving on public roads. This license plate allows the police and other drivers to identify the vehicle. Similarly, in order to manage the small UASs, it is necessary to have an equivalent structure that functions as a car license plate.

Instead of stamping letters and numbers on the aircraft as is done in the related art, the present example implementation is a light array that blinks a unique color pattern sequence for each aircraft. An advantage of this identification mechanism is that a person can visually identify an aircraft from about 500 feet distances without the use of any special equipment. The color sequence can be defined by the pilot, the fleet control, or even by a regulatory agency. The number of colors used and the size of the sequence define the number of possible codes.

The light array works together with the electronic identification box. The box has a position logger and a transponder, which may be mobile. The logger has a global positioning system (GPS) module to obtain the absolute position of where the aircraft is flying. The logger stores the flight path of each trip made by the vehicle. The speed and heading are also stored with the positioning information. Telemetry data provided by the aircraft sensors – such as 3-axis acceleration and power level – and application data provided by the autopilot or any embedded component are also stored. This information is the proof of the aircraft real flight data and works as a civil aviation “black box” in case of a crash. In addition, for a UAV doing an autonomous flight beyond line-of-sight, the data shows where the UAS flew. However, the present inventive concept is not limited to the above-enumerated information, and any other data may be added or substituted therefor, without departing from the scope of the example implementations.

The transponder transmits a code through the RF frequency similar to the one generated (e.g., blinked) by the light arrays, allowing automatic identification by any RF receiver on land or installed in other aircrafts. In addition to the code, the transponder also transmits the last position, heading and speed, allowing the implementation of a collision avoidance system. The identification box also has an independent battery known by those skilled in the art so the transmitter works even without the external power supply. In case of an aircraft crash, the transponder will keep transmitting the last known position to help to find the wrecked vehicle.

The identification box also has a photo sensor to receive external signals. When the photo sensor is excited with a high luminous beam in a specific wavelength (e.g., a laser beam), the identification box can change its operational behavior. For instance, it can change its light brightness, send commands to the autopilot, or increase the data storage frequency, in addition to other options. One of the preset configurations for the photo sensor stimulation is to modify flag data in the RF data sent by the transmitter, and/or to modify the behavior of the blinking pattern. In some scenarios, there will be many aircrafts flying close to each other such that a receiver on the ground would detect all of them without knowing which UAV is transmitting each identification code. Therefore, it is just a matter of directing a specific wavelength light beam emitter to one of the aircrafts and the aircraft will thus modify its behavior and its transmitted data, allowing the data-to-vehicle association. This feature creates a duplex communication, allowing the identification box to send data by its color light emitters and receive data through the light sensor. Commands can also be received and executed using the communication channel. Through a physical connection between the identification box and the UAV autopilot, the identification box can, for instance, receive a way point change command through a modulated light beam and change the UAV destination coordinates.

Ground Identification Device

A police department has law enforcement agents who supervise the roads and highways in order to detect drivers disobeying traffic laws. Devices such as radar allow police officers to detect vehicle speeds. Moreover, license plates allow for identifying the vehicle owner and accessing the complete history of the vehicle. This kind of control allows for small remote controlled aircraft surveillance and regulation.

In this way, a ground device to assist the aircraft identification has been invented. Since the electronic identification box relies on visual information, the ground device was equipped with a camera and image processing algorithms in order to capture the color sequence. In addition, this device has the RF

receiver capable of receiving the identification box RF signal to cross both information and verify the authenticity.

The aircraft code and the position where the aircraft was detected are submitted to the central identification server to identify its owner, the responsible pilot and the flight permission. Hence, if the ground user wants to check if one specific vehicle has permission to fly in that area, he just points the identification device to the aircraft. It automatically handles the identification and crosschecks with the central database. After the central system replies, the device shows on the screen if the aircraft position and timestamp is according to its permitted flight plan. In a positive case, the device screen shows a “valid” message. Otherwise, the user will see an “invalid” message. Clicking in the message will reveal the entire information database of the aircraft.

Brief Description of the Several Views of the Drawings

FIG 1. Is the external view of the identification box with 4 light arrays.

FIG 2. Is the schematic view of the identification box.

FIG 3. Is the external view of the ground identification device facing forward and backward.

FIG 4. Is the schematic view of the ground identification device.

FIG 5. Is the user interface of the ground identification device.

FIG 6. Is the server process flow.

FIG 7. Is the identification box software flow.

FIG 8. Is the ground device software flow.

Reference Numerals in the Drawings

1 – Identification box	2 – Light arrays
3 – Light emitters	4 – Light sensor
5 – RF antenna	6 – Location system antenna
7 – Memory card slot	8 – Power connector
9 – Housing	10 – Autopilot data connector
11 – Light emitter	12 – RF antenna
13 – Location system antenna	14 – Location module
15 – Non-volatile storage module	16 – RF module
17 – Light controller module	18 – Central control module
19 – Light receiver	20 – Internal power storage
21 – Ground identification device	22 – Camera with zoom
23 – Light beam emitter	24 – Touchscreen
25 – General buttons	26 – RF antenna
27 – Location system antenna	28 – Data communication antenna
29 – Housing	30 – Data connector

31 – Light beam emitter	32 – Camera module
33 – RF antenna	34 – Data communication antenna
35 – Light beam modulator	36 – Image processing module
37 – RF module	38 – Data communication module
39 – Central processing unit	40 – Location system antenna
41 – Location module	
51 – ID captured by the camera	52 – Aircraft responsible name
53 – System message	54 – Detection window
55 – RF detected IDs	56 – General buttons
61 – Aircraft data request flow	62 – Aircraft route confirmation process
63 – Aircraft destination confirmation process	
71 – Main loop flow	72 – Light beam detection flow
73 – Light beam command execution flow	
81 – Identification procedure flow	82 – Light beam excitation flow
83 – Light beam command transmit flow	

Detailed Description of the Invention

FIG. 1 shows the perspective view of one of the two components of the example implementation; FIG. 2 shows its schematic with the internal components; FIG. 7 shows firmware execution flow. The identification box 1 includes light arrays 2 composed of several light color emitters 3. These color emitters 3 are controlled by the light controller module 17, and they generate (e.g., blink, variable light intensity or color fade, or other similar operation as would be understood by those skilled in the art) a defined color sequence programmed in the unit firmware executed by the central control unit 18 and following the main loop flow 71. The identification box 1 also has a radio antenna 5 connected to a RF module 16 that transmits the same code or a modified version of the code through radio signal. The RF module 16 also can receive RF signals from nearby identification boxes installed in other aircrafts and save this information in the non-volatile storage module 15 that is connected to the memory card installed in the memory card slot 7. The example implementation also has one light detection sensor 4 connected to a light receiver module 19 capable detecting external excitation by a light beam with defined wavelength and intensity. In case of external light detection by the light sensor 4, the light beam detection flow 72 is executed. Consequently, the behavior of the identification box can change. For instance, it can add or change extra data information to the transmitted RF signal, or change the light blink pattern or intensity. Besides the identification part, the identification box 1 also has a location system antenna 6 (e.g. GPS antenna) connected to a location module 14 to log the flight path in the storage module 15. This positioning data (e.g. GPS data, camera motion capture, radio triangulation system, or the like) is also transmitted by the RF module 16 with the identification code.

The identification box 1 has also an external power connector 8 used to recharge the internal power storage 20 (e.g., Li-Po battery or super capacitor) and supply power to all internal and external

components. In case no power is supplied, the internal power storage 20 can supply power to all the components. In this “no external power” state, the RF module 16 will keep following the main loop flow 71, transmitting the last location position and the identification code until the battery runs out of power, while the other components will be in a sleep mode. All of the internal components are protected by a housing 9 against impact and weather, in order to resist a crash without damaging the internal circuit.

The other component of the example implementation is the ground identification device 21 seen in perspective in FIG. 3 and its internal schematic in FIG. 4. In addition, the main user interface is shown in FIG. 5, the server process in FIG. 6 and its firmware process flow in FIG. 8. The ground identification device 21 has a camera with zoom 22 capable of capturing video in real-time. The identification procedure flow 81 is executed to process the video and identify the aircraft. This video is provided to an image processing module 36 that analyzes the image to detect that the identification box blinks and capture the blink sequence. In case of a successful detection, the detected code is displayed in the touchscreen 24 in the field 51. A detection window 54 will be shown around the detected aircraft. A request to a server will be made to get more aircraft data, following the aircraft request data flow 61. Other information, such as the aircraft owner is presented in the field 52. A location system antenna 27 (e.g., GPS antenna) is connected to a location module 41 in order to get the position where the aircraft was detected. Both information, the detected ID and the location detection position, are transmitted to a server through a data communication antenna 28 connected to a data communication module 38 (e.g. cellular network or Wi-Fi). The server will follow the aircraft route confirmation process 62 and reply with an ID verification message that is presented in the field 53 of the touchscreen 24.

The ground identification device 21 also can detect aircrafts through the RF signal transmitted by the identification box RF module 16. The signal is received by the RF receiver antenna 26 connected to the RF receiver module 37. Since many signals can be received at the substantially same time by the receiver module 37, the detected IDs are presented in the field 55 in a list format. If at any time the users decide to use the touchscreen 24 to click on any ID number, a request will be made to a server following the aircraft information flow 61 to show more information about that aircraft.

In order to excite the identification box light sensor 19, the ground device has a light beam emitter 23 connected to a light beam modulator 35. The light beam excitation flow 82 is executed by the ground device 21. This beam, when captured by the light sensor 19 will change the data transmitted by the identification box RF module 16. This difference in the data is detected by the ground device RF module 37, and the light excited aircraft ID presented in the field 55 will be shown in a distinguishable form (e.g., bolded).

The ground device internal components are protected by a weather proof housing 29. The front screen panel has few general-purpose buttons 25 that can be configured, for instance, to activate the light beam.

The identification box light emitters 3 and light sensor 4 create a two-way communication system. Similarly, the ground device camera 22 and light beam emitter 23 also create the same kind of communication. The RF receiver and transmitter 16 and 37 in both devices also creates a duplex communication. Therefore, the identification box 1 and ground device 21 together can exchange information through light or RF. This feature allow other applications. An example application is to send data to a UAV through light and RF. For instance, a delivery drone can receive a message to update its

destination coordinate when it get closer to the delivery address as described following. The ground device 21 detects the UAV flying at a long distance from the user address through the RF signal received by the RF module 37. The ground device 21 communicates with the server sending the received ID and the device location measured by the location module 41 (e.g., GPS, AGPS, Wi-Fi mapping or cellphone tower position) to check if the received ID belongs to a delivery UAV going to the ground device position. The server follows the aircraft destination process flow 63 in order to return the confirmation to the ground device 21. When the server confirms if the UAV is going to the ground device position, the ground device 21 shows on its screen 24 a message informing the user that his delivery is arriving. The user goes outside, points the ground device 21 to the UAV, and uses one of the general-propose buttons 25 to turn on the light emitter 23. At this moment, the ground device 21 will start to transmit its position through the RF module 37. The light sensor 4 of the identification box 1 detects the light beam and the RF module 16 receives the ground device 21 position. The identification box central control module 18 sends destination updates to the UAV autopilot through the autopilot connector 10. After that, the UAV will update its destination to drop the delivery in the exact location the user is transmitting.

In addition, other applications can be explored if the ground device 21 is attached to an aircraft, and the identification box 1 is attached to a ground object. For instance, an automated landing procedure in a mobile landing pad attached to a vehicle can use these devices in this configuration. The identification device 1 is attached to several landing pads, each one sending a unique identification code through the light emitters 2 and the RF module 16 simultaneously. The aircraft with the ground device 21 pointing to the ground receives the landing pad ID and the location data through the RF module 37. A connection between the aircraft autopilot and the ground device 21 through the data connector 30 allows the ground device to send messages to the aircraft (e.g., destination coordinates update). After receiving the landing pad ID, the ground device 21 searches for the landing pad visual position of that specific landing pad color sequence using the camera 22. This allows a fine control of the aircraft using real-time optical navigation to approach and land in the moving landing pad. This application can be executed in an outdoor and indoor environment, even without the location data been transmitted by the landing pad identification box.

Finally, the ground device 21 can modulate data through the light beam modulator 35. The identification box central control module 18 can demodulate the light beam in order to execute commands. The light beam command transmit flow 83 is executed by the ground device 21. The user selects the command on the screen 24, and the light beam modulator 35 turns the light beam emitter 23 on and off in a defined frequency and protocol. The identification box light sensor 4 detects the modulated light beam and sends the binary data to the central control unit 18 that executes the light beam command execution flow 73. After the command execution, the identification box 1 sends the execution results (e.g. an ACK, or an error status code) to the ground identification unit 21 through the RF module 16 and it can also change the color sequence to show the result visually. For instance, the light controller module 17 can turn the red color on for a while in case of an invalid command, and the green light in case of a successfully executed command.

Improvements on Related Art

The related art aircraft identification systems focus on civil or military aviation. None of the related art systems work for a small aircraft in a low altitude. Using a visible light sequence, any person can visually identify an aircraft in a low altitude flight.

The other related art identification systems for aircraft need a radar system or special devices to be able to receive the identification signal, which works well for a scenario involving an airport tower and an aircraft, but does not work for a scenario involving a person and an aircraft.

Using visible light identification, a person can observe an aircraft and memorize its color sequence. This approach is similar to the way cars are identifiable by their license plates, instead of the way aircrafts are identified in the related art.

Other Uses or Applications for This Invention

This invention is an identification system that can be used to identify any vehicle, ship, aircraft, or other static or mobile objects that is located up to about one mile from an identifier such as a person or other object.

Claims

1. A device that transmit an identification (ID) code using visible light sequence.
2. The device of claim 1, where the color sequence consists of a sequence of different colors in loop.
3. The device of claim 1, where the color sequence consists of just one color with different blink times.
4. The device of claim 1, with other light emitters like LEDs, OLEDs, quantum dots, light bulbs, laser beams, and others.
5. The device of claim 1, where the ID is transmitted by radio frequency (RF).
6. A device that automatically captures the visible code transmitted by the device of claim 1.
7. The device of claim 6, where the code is received by the RF signal that the device of claim 5 transmits.
8. The system comprising the device of claim 1 and the device of claim 6.
9. The system comprising the device of claim 5 and the device of claim 7.
10. The device of claim 1, with an external light detection sensor.
11. The device of claim 5, where the location data is transmitted together with the ID.
12. The device of claim 11, where extra data is transmitted together with the ID.
13. The method of detecting a defined wavelength and intensity light beam to change the extra data transmitted by device of claim 12.
14. The method of detection by the device of claim 7 when the device of claim 10 detects the defined light beam.
15. The device of claim 7, with a defined light beam emitter.
16. The device of claim 7, with a location receiver.
17. The device of claim 7, with a GPS receiver.

18. The device of claim 7, with a cellular network modem.
19. The device of claim 7, with a wireless radio data link.

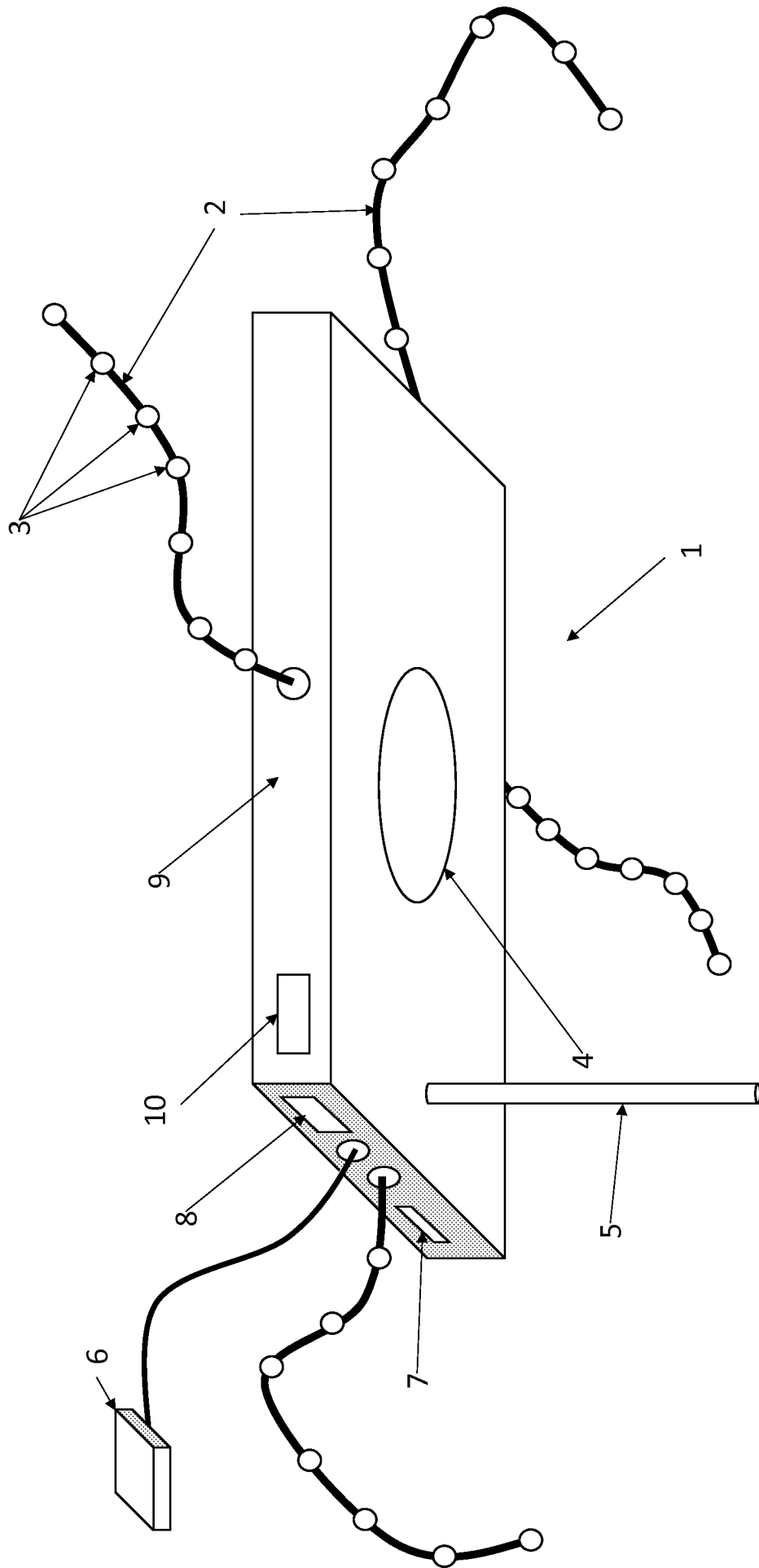
Abstract

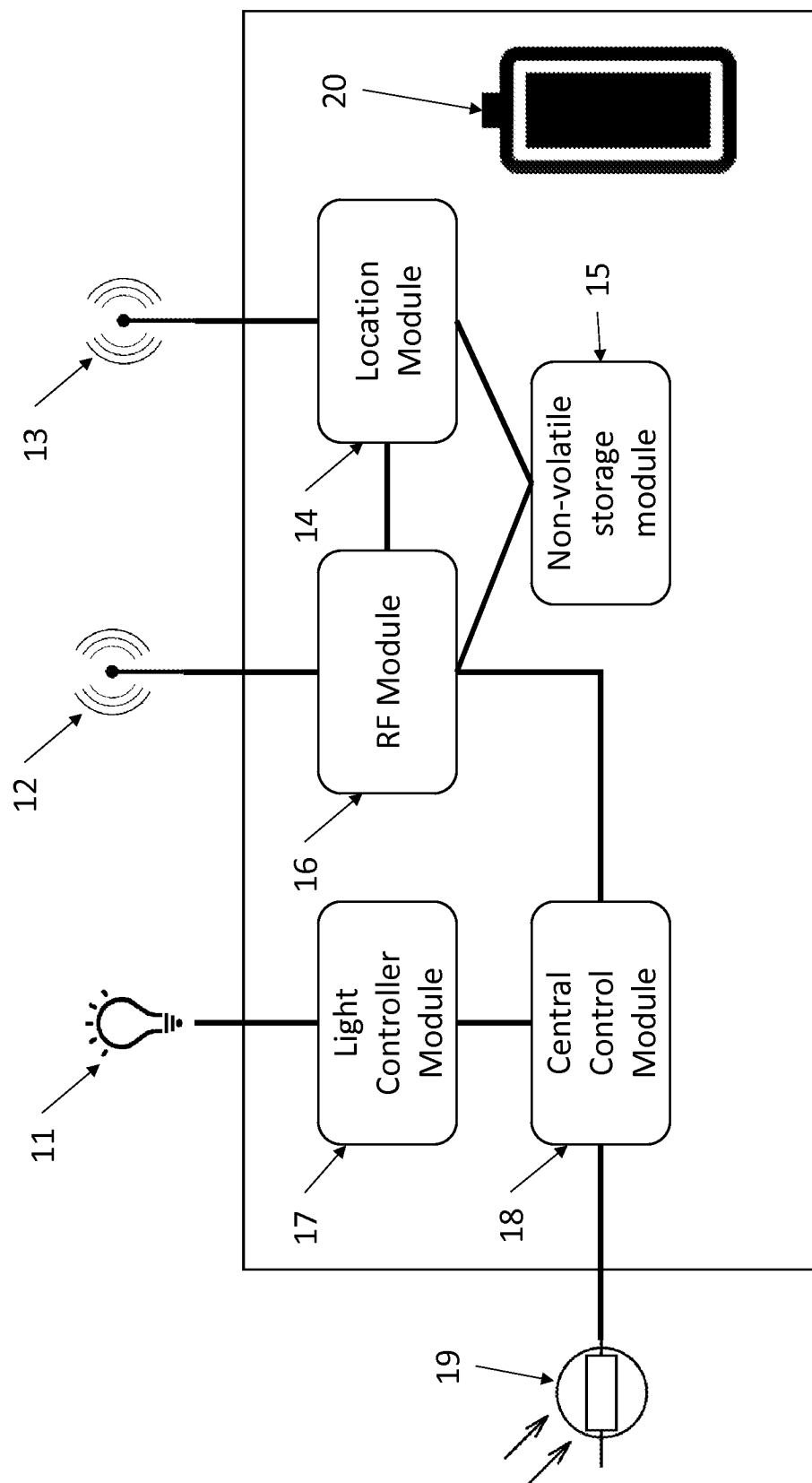
The present invention describes a low altitude aircraft identification system composed by two components: a small aircraft electronic identification box with an embedded logger, and a ground identification equipment to automatically identify the aircraft just pointing at it.

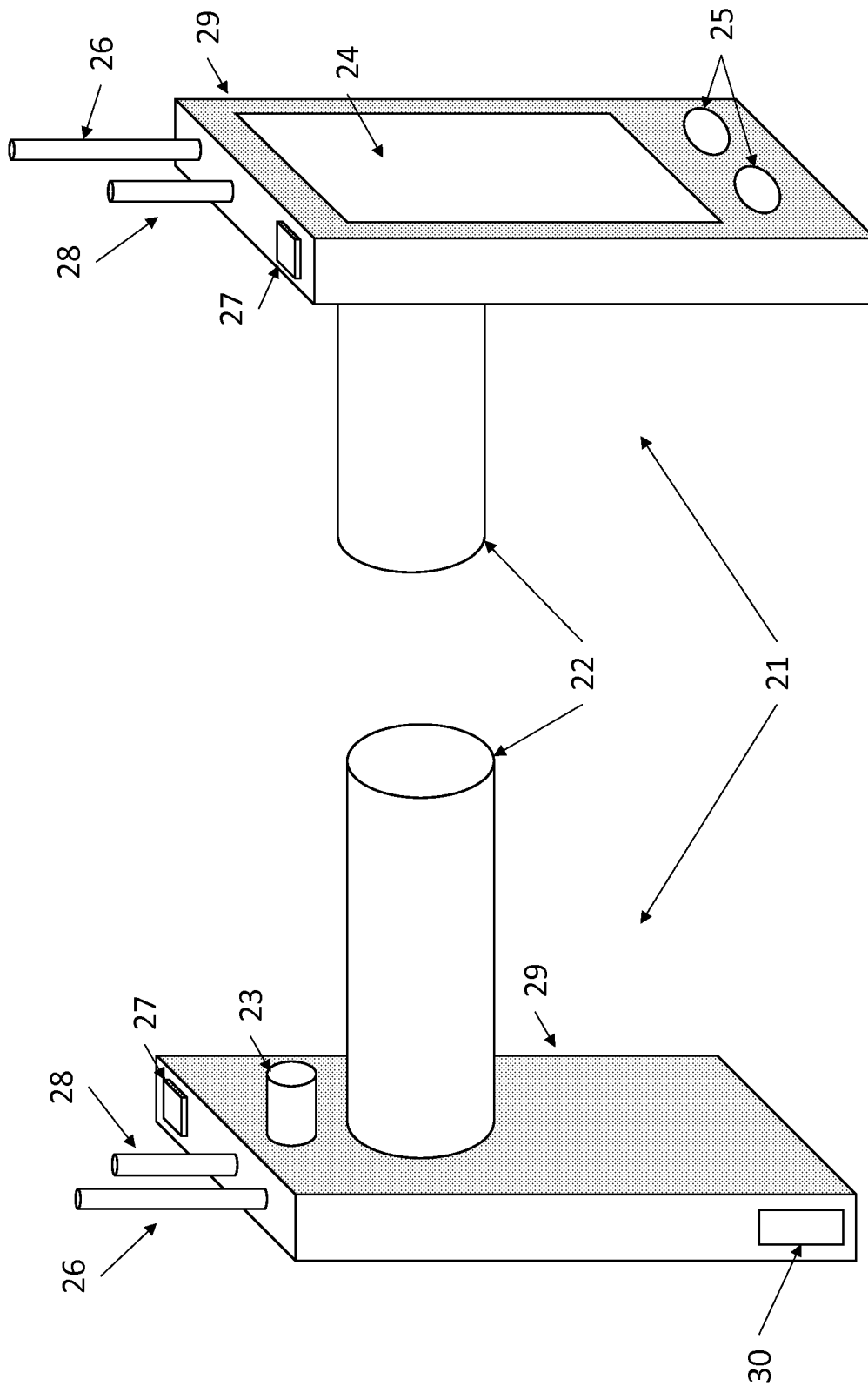
The identification code can be transmitted by a visible light color sequence or by a radio frequency signal. The ground identification device is capable of recognizing both kinds of code.

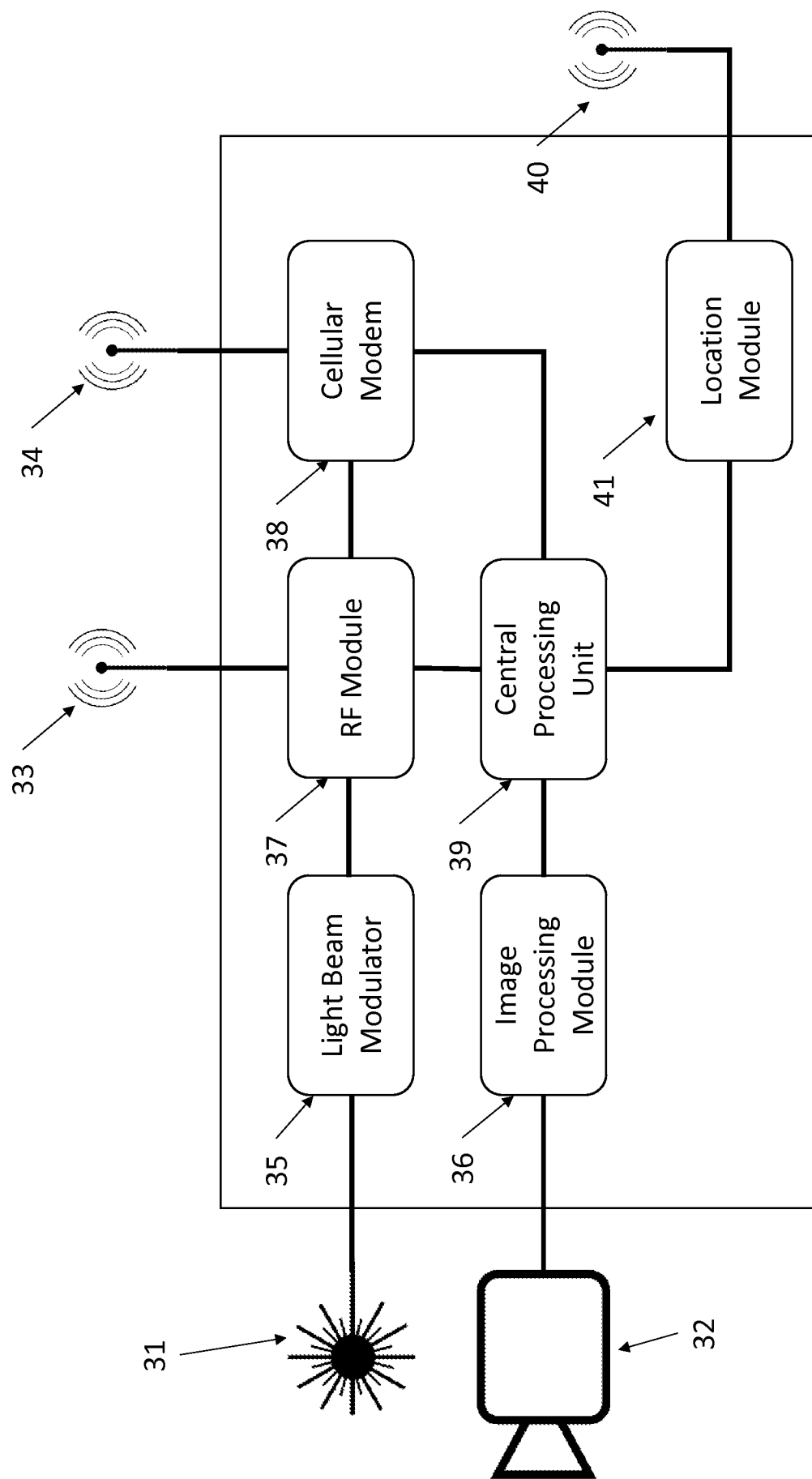
References

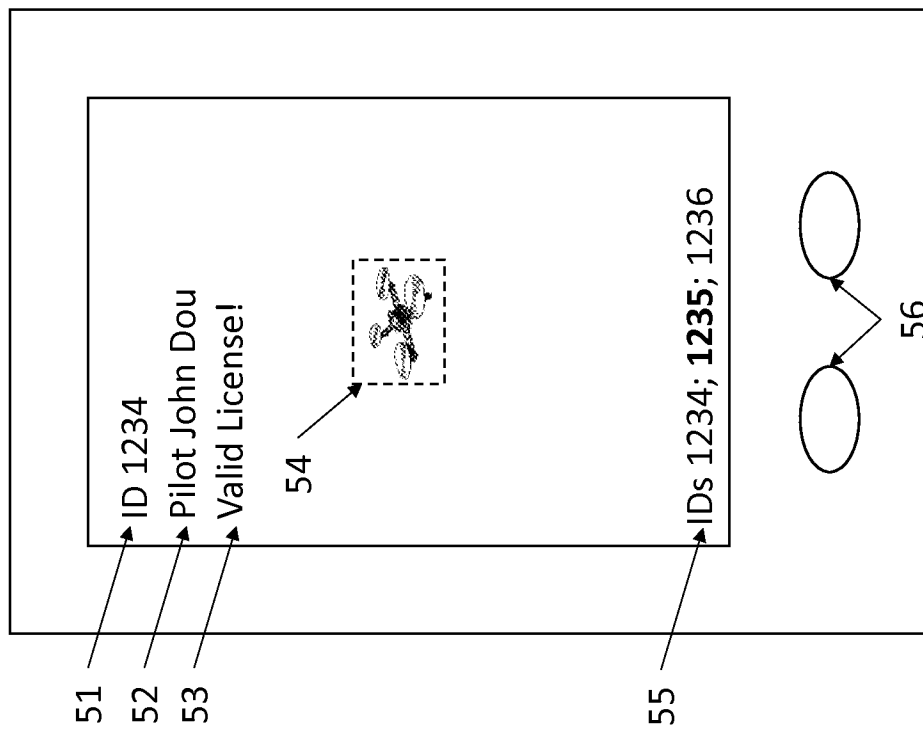
1. Friend or foe - Use an encoded light emitting system that has a receiver to measure the ambient light and control the transmitter. The light code can only be decoded using a key. <https://www.google.com/patents/US20100266126?dq=US+20100266126&hl=en&sa=X&ei=XuhAVObONeSxiwLU44DQBQ&ved=0CB0Q6AEwAA>
2. Mobile tracking and subduing apparatus, method, and computer program product - This is a device that can be installed in the drone to use camera to detect the target and a probe to inject some liquid into the target. <https://www.google.com/patents/US20140018769?dq=20140018769&hl=en&sa=X&ei=ge1AVPaSBsv5ogTQ1IHQCQ&ved=0CB0Q6AEwAA>
3. Systems and methods for detecting and managing the unauthorized use of an unmanned aircraft - This patent is for a box embedded in the drone that allow a takeover control request from a ground station. <https://www.google.com/patents/US20120022719?dq=20120022719&hl=en&sa=X&ei=EOxAVPPMCYKgoQTpvoHgCA&ved=0CB0Q6AEwAA>
4. Comprehensive management network platform of civil unmanned aerial vehicle - This patent presents a complete solution using communication, drones, ground control and an air traffic control. <https://www.google.com/patents/CN202694592U?cl=en&dq=traffic+control+uav&hl=en&sa=X&ei=ey88VOflUG8asogTR1YLoDw&ved=0CB0Q6AEwAA>
5. Unmanned aerial system position reporting system - Device used to identify big drones using RF. <https://www.google.com/patents/US8386175?dq=traffic+identification+uav&hl=en&sa=X&ei=wyQ8VOLEAoKooQTosoCQDQ&ved=0CCsQ6AEwAg>
6. Electronically file and fly unmanned aerial vehicle - This is an automated flight plan transmitter and receiver, to approve the drone flight plan. <https://www.google.com/patents/US20120143482?dq=traffic+identification+unmanned+aerial+vehicles&hl=en&sa=X&ei=ziY8VlnzAsuvogSigtCwAQ&ved=0CEkQ6AEwBg>
7. Unmanned aerial system position reporting system and related methods - Communication system to keep the drone online transmitting its position through different networks. <https://www.google.com/patents/US8437956?dq=traffic+identification+unmanned+aerial+vehicles&hl=en&sa=X&ei=NCc8VKL6E8KgoqSZ1YKqDw&ved=0CCUQ6AEwATge>
8. Optical flow-based four-rotor unmanned aerial vehicle flight control method - Flight control just using a camera and optical flow. <https://www.google.com/patents/CN103365297A?cl=en&dq=traffic+identification+unmanned+aerial+vehicles&hl=en&sa=X&ei=NCc8VKL6E8KgoqSZ1YKqDw&ved=0CBwQ6AEwADge>

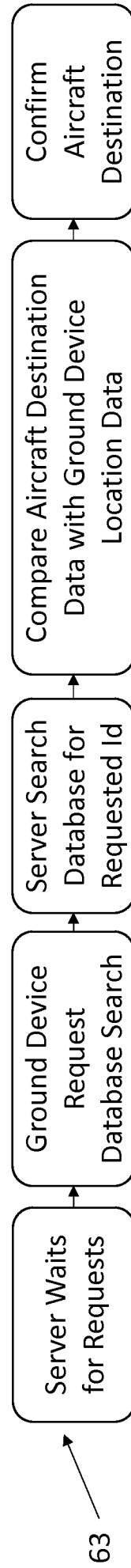
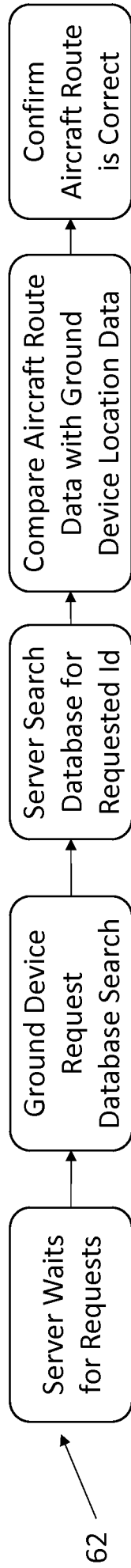
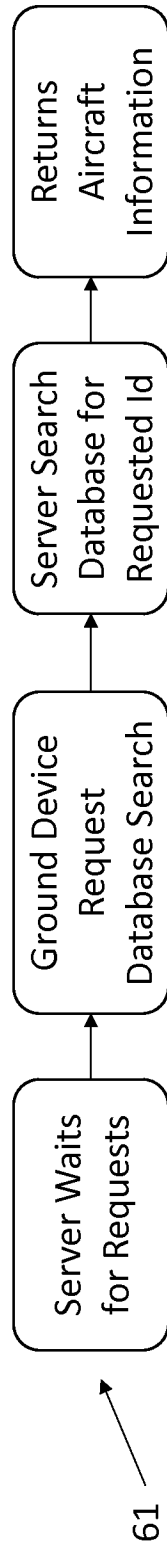


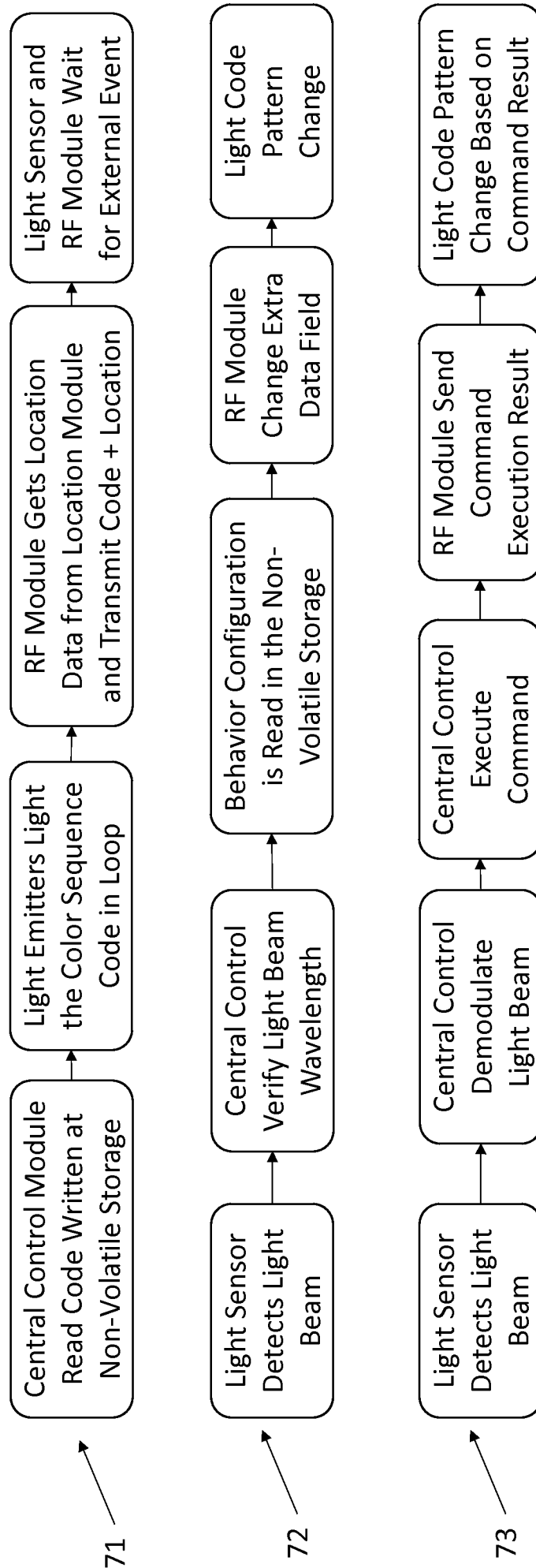


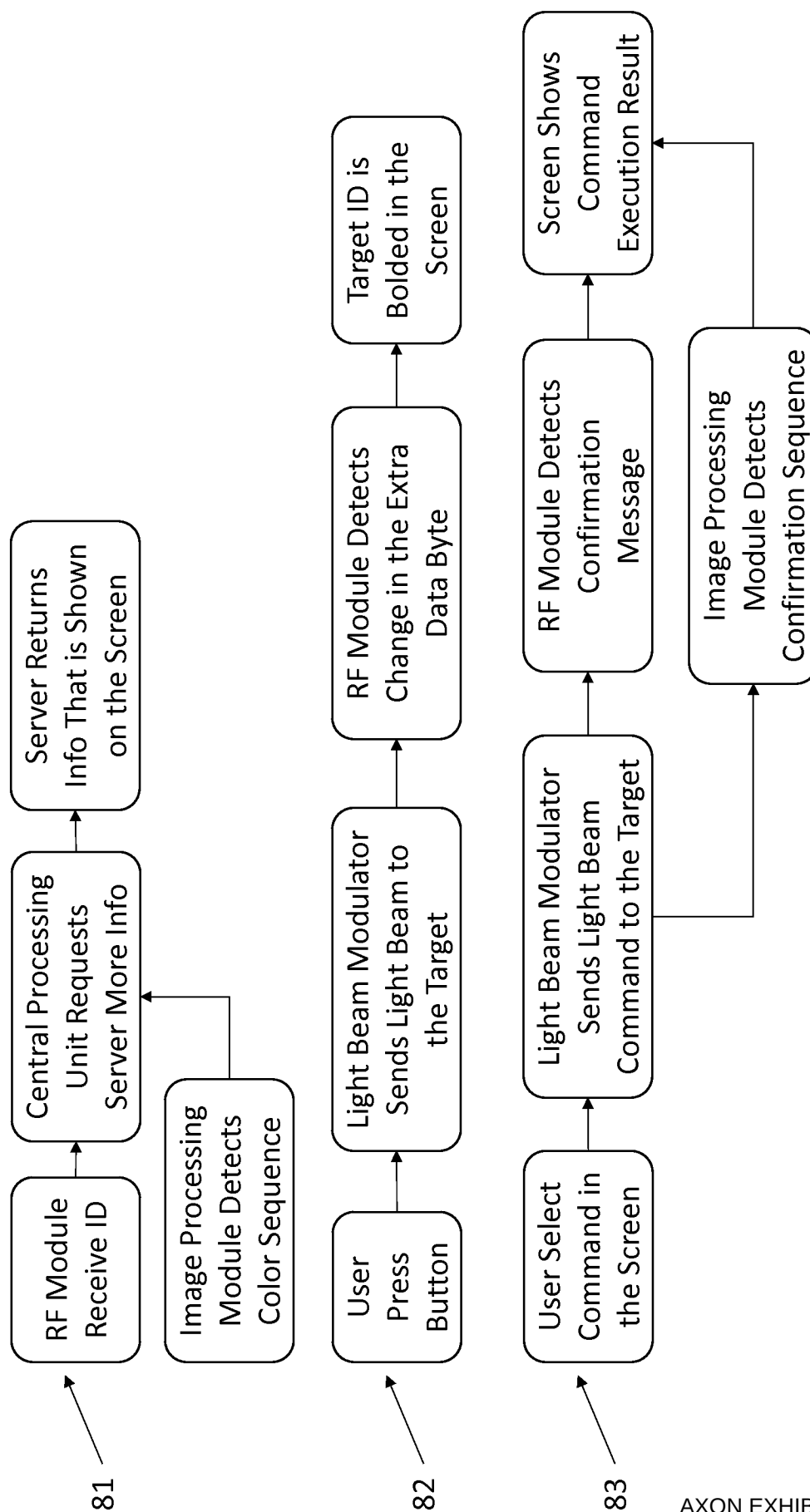












Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	A low altitude aircraft identification system			
First Named Inventor/Applicant Name:	Aislan Gomide FOINA			
Filer:	Ernest C. Huang/saori weller			
Attorney Docket Number:	999999-900098			
Filed as Micro Entity				
Filing Fees for Provisional				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Provisional Application Filing Fee	3005	1	65	65
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				65

Electronic Acknowledgement Receipt

EFS ID:	22623272
Application Number:	62175153
International Application Number:	
Confirmation Number:	9901
Title of Invention:	A low altitude aircraft identification system
First Named Inventor/Applicant Name:	Aislan Gomide FOINA
Customer Number:	27189
Filer:	Ernest C. Huang/saori weller
Filer Authorized By:	Ernest C. Huang
Attorney Docket Number:	999999-900098
Receipt Date:	12-JUN-2015
Filing Date:	
Time Stamp:	19:21:35
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$65
RAM confirmation Number	5678
Deposit Account	502075
Authorized User	HUANG, ERNEST C.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	99999_ADS.pdf	1503235	no	6
			2d8a5f4aa9ac9bd167208aaa1ed88e8da029d2c7		
Warnings:					
Information:					
2	Certification of Micro Entity (Gross Income Basis)	99999_micro_entity_status.pdf	120624	no	2
			eea13c6fde1486e61ab3dbaa639a530179bb657e		
Warnings:					
Information:					
3	Provisional Cover Sheet (SB16)	99999_provosional_cover_sheet.pdf	1477156	no	3
			7650d28c5418f37076054eba906af0690ba840ee		
Warnings:					
Information:					
4	Specification	99999_specs_pdf.pdf	217895	no	16
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Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	29584	no	2
			dc443ba6aa5ed0363d6c43d7fd2181ac2b8ccee1		
Warnings:					
Information:					
Total Files Size (in bytes):			3348494		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	999999-900098
		Application Number	
Title of Invention	A low altitude aircraft identification system		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--

Inventor Information:

Inventor 1					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Aislan	Gomide	FOINA		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	El Cerrito	State/Province	CA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	5911 Central Avenue				
Address 2					
City	El Cerrito	State/Province	CA		
Postal Code	94530	Country i	US		

Inventor 2					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Raja		SENGUPTA		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	El Cerrito	State/Province	CA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	715 Seaview Drive				
Address 2					
City	El Cerrito	State/Province	CA		
Postal Code	94530	Country i	US		

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.

Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	999999-900098
		Application Number	
Title of Invention	A low altitude aircraft identification system		

☐ An Address is being provided for the correspondence information of this application.

Customer Number	27189		
Email Address	docketing@procopio.com	Add Email	Remove Email

Application Information:

Title of the Invention	A low altitude aircraft identification system		
Attorney Docket Number	999999-900098	Small Entity Status Claimed	☐
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	27189		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	999999-900098
		Application Number	
Title of Invention	A low altitude aircraft identification system		

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove			
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐	This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
--------------------------	--

Authorization to Permit Access:

☒	Authorization to Permit Access to the Instant Application by the Participating Offices
If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	999999-900098
		Application Number	
Title of Invention	A low altitude aircraft identification system		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.				
Applicant 1				Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.				
Clear				
☐ Assignee	☐ Legal Representative under 35 U.S.C. 117		☐ Joint Inventor	
☐ Person to whom the inventor is obligated to assign.		☐ Person who shows sufficient proprietary interest		
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:				
Name of the Deceased or Legally Incapacitated Inventor :				
If the Applicant is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information:				
Address 1				
Address 2				
City		State/Province		
Country i		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Applicant Data may be generated within this form by selecting the Add button.				
Add				

Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	999999-900098
		Application Number	
Title of Invention	A low altitude aircraft identification system		

Assignee 1				
Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).				
Remove				
If the Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information:				
Address 1				
Address 2				
City		State/Province		
Country i		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee Data may be generated within this form by selecting the Add button. Add				

Signature: Remove				
NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications				
Signature	/Ernest C. Huang/		Date (YYYY-MM-DD)	2015-06-12
First Name	Ernest C.	Last Name	Huang	Registration Number
				60083
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