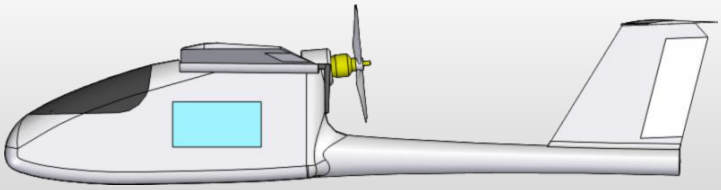
airelectronics
UAV AUTOPILOTS



Observation Skywalker

We offer a complete solution for a user that need to put an observation camera in the air at low cost, completely designed by the Spanish company Airelectronics.

The fully tested Skywalker platform has been selected to carry the observation system, providing a forward looking camera and a side looking pointed camera.

This configuration is perfect for observation purposes. The forward camera allows the operator to have o global view of the plane situation, while the side camera allows detailed observation of points when orbiting them.

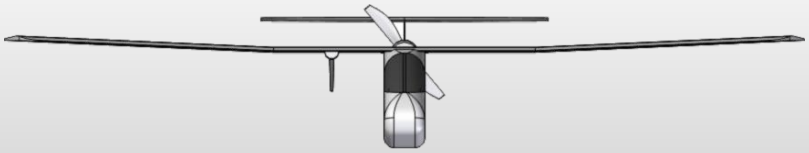
The side camera, servo-pointed, is designed to make such observations, maintaining the observed point into the field of view even when the plane attitude changes brusquely.

Using a standard computer, the user can plan, fly and modify the UAV mission in real time in the easiest possible way thanks to the U-Pilot flight control system and the U-See ground software. The operator doesn't need any previous flight experience and it is not even necessary to have a manual joystick because the system can fly 100% in automatic mode from the take-off to the landing. In case of a communications problem the plane will came back home and land safely.

The plane is based in COTS materials (Commercial off-the-shelf) and has been adapted to became a complete UAV. Due to the fact than the plane has been built using composites and EPO its weight is really low ,making the plane really easy to hand launch and to land: any operator can do it, even without any previous skill, and it will land on its fuselage without big damage in almost any terrain.

The video and data links are handled by the new U-Station, a single box covering all the needs of any ground station. U-Station handles data and video links simultaneously and only requires two connections: the Futaba Emitter input and the usb cable to the computer, handling both video and data feed.

U-Station's integrated battery simplifies the deployment of the the station, making it autonomous and preventing the use of external batteries or generators.



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The brain for the plane is the Airelectronics' U-Pilot flight control system, which is embedded inside the plane's fuselage, leaving a lot of space on board to install extra payload or batteries. Being based in FPGA technology, U-Pilot's configurability and flexibility is unsurpassed and the advanced sensor mixture using extended Kalman filtering assures an optimal attitude and navigation control.

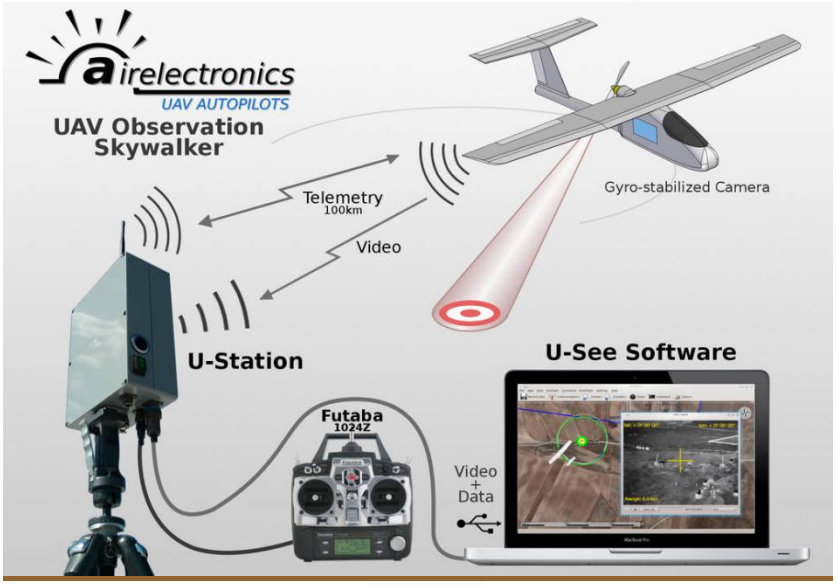
U-Pilot can fly the aircraft using waypoint navigation, even when the GPS signal has been lost by using dead-reckoning navigation. Can also orbit around a ground location and can fly directly towards a map clicked location.

Its control laws has been optimized for the control of the electric motor the UAV Skywalker uses, having automatic modes that take advantage of the energy present in the atmosphere: The plane has capability to climb taking advantage of the convective activity (thermal soaring). This way it gains flight time and extends its range. This gives almost unlimited loiter time over a forest fire.

It also monitors the amount of energy that came from the batteries and uses the batteries up to the point it is bingo time. Batteries packs are available in 5.000 mAh and 10.000 mAh.

The UAV Skywalker is available in the basic and Pro versions, providing the latter some additional features that are useful in some applications.

The electronics inside the Skywalker Pro have sensor redundancy, meanwhile the plane has a belly protection that reduces the damage absorbed by the hull when landing in hard environments. The Skywalker Pro features a new Li-Ion Battery that doubles the standard Skywalker endurance and allows the plane to perform a high slope takeoff, recommended when working in areas with obstacles.



To allow landing in these areas, the Pro version also has spoilers that allow the plane to land within a few meters. A landing and takeoff slope diagram can be found at the end of this document.

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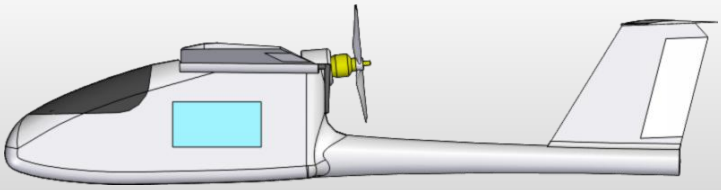


Observation Skywalker

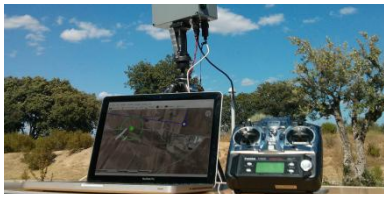
Highlights

Thermal Soaring
Take advantage of the atmosphere energy

Fully autonomous
No human intervention required during flight

Observation Cameras
Camera configuration to maximize observation capability

Affordable
Unlike other solutions, the prices are reasonable



Easy to deploy
The new U-Station makes really easy and fast to deploy the system

Bat. monitoring
Real time battery monitoring assures that you won't loose the aircraft due to overuse

Real-Time Video Feed
The U-Station combines the video and data link in a single box

Flight-Plan
Automatic flight plan following allows to complete unattended missions

Camera geo-reference
The system can give geo-referenced images

Possible Applications

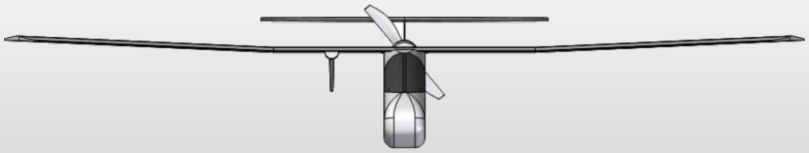
Border control
Survillance in terrestrial and maritime borders

Police Usage
Demonstration control, anti-drug operations

Agriculture
Status of crops, Forest mass control, study of soil

Fire Fighting
Monitor Active fires, avoid reactivation of controlled fires

Military
Forward observer, over the hill recon missions



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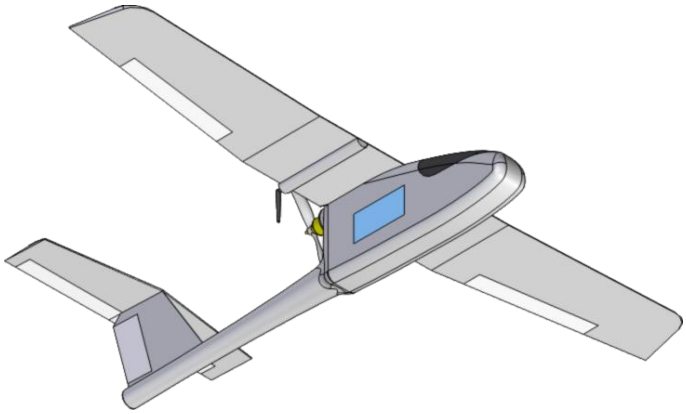

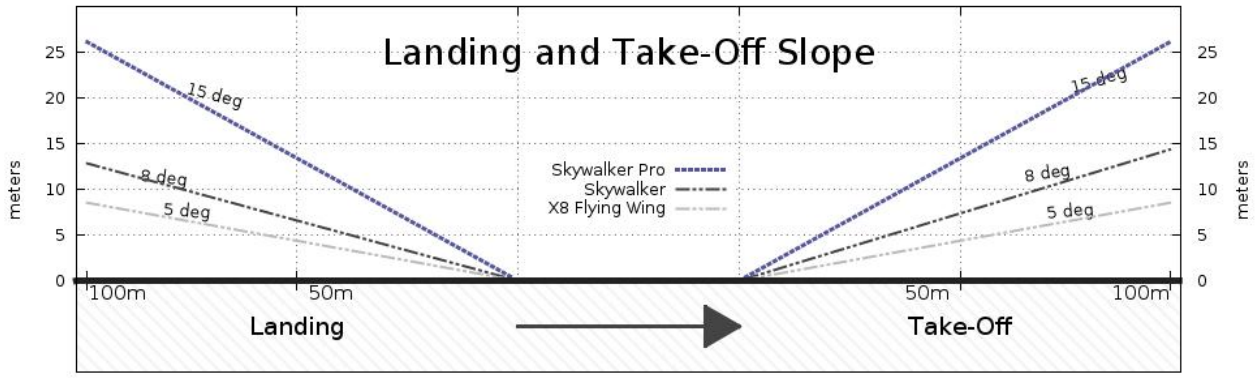

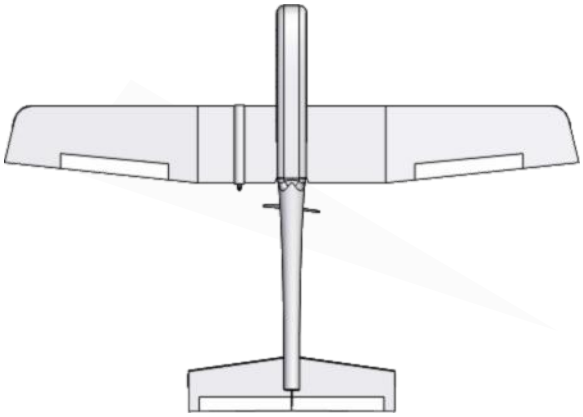

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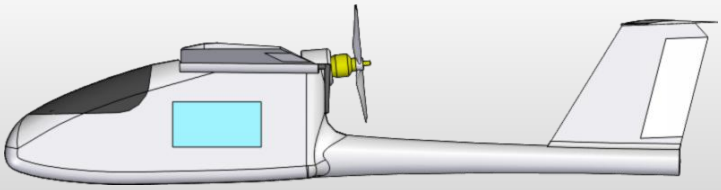

Observation Skywalker

Flight control Specification

Flight control
Attitude Estimation & control..... 1000Hz rate
Flight-plan..... Up to 200 way-points
Speed Control..... Auto-throttle
Take-Off & Landing..... Automatic

GPS Positioning
SBAS..... Global coverage
Differential navigation..... available on request

Interface with Payloads & Actuators
PWM & GPIO outputs.....30
PWM rate..... Configurable
RS-232 ports.....4 RS-232 compliant ports
RS-232 Rates.....9600 – 115200 bps
External ADC channels.....3 channel 12bit - 0-30 V
Main Voltage supply supervisor

Telemetry
Data-Link Frequency 900MHz/1.4 Ghz/2.4GHz
Power.....1 W
Range.....100 km / 80km / 40 km
baud rate..... 115200 bps

Air Data System
Dynamic pressure sensor range.....0 – 200 km/h
Static pressure, low altitude option ..... 0-2000 m
Static pressure, high altitude option.....0-4000 m

Plane Specification

Dimensions
Length..... 1100 mm
Wing Span..... 1680 mm/1880mm
Payload Bay..... 3450 cm^3

Weights
Empty Weight.....1,3 kg.
Maximum Take-Off Weight..... 3,0 kg.

Endurance
5.000 mAh battery option.....30 min minimum
10.000 mAh battery option.....1 hour minimum
15.000 mAh battery option.....1.5 hour minimum
Long endurance battery option. 2.5 hour minimum

Typical Crusing speed..... 45 km/h
Air Brake for short landing.....Optional

U-Station Specification

Main Dimensions (WxHxL)..... 230x310x110 mm
Mechanical mounting..... Standard plate
Tripod height.....710 mm/ 2000 mm
Main Box weight.....2.3 kg
Tripod weight..... 2.6 kg
USB connector..... IP68 Ruggered USB Type B
Charging connector 2-way MIL-C-5015-10SL
Joystick interface..... 3-way MIL-C-5015-10SL
Radio Connector.....SMA female
Temperature Range.....-30 °C to +85°C
Power Supply.....NiMH/LiFe Battery
..... Optional external +12VDC supply
Power Consumption.....12 V
Voltimeter.....0 - 20 V

Emitter Interface

Type..... 3 way MIL-C-5015-10SL
Protocol.....PCM 1024Z at 3.3V TTL
Recommended Futaba emitter.....Futaba T7CP

Minimum Hardware for Control Computer

The recommended hardware is the MacBook Pro 13” with BootCamp and Microsoft Windows 7.
OS..... Linux or Windows
Processor..... Intel Core i5
RAM.....2GB
Hard drive..... 5 free Gb
Video Card.....OpenGL supported
Screen..... at least 13"
Ports .....1 RS-232 port
.....(native or through USB adaptor)

Video Receiver

Dimensions
Frequency.....1.2-1.3 GHz/2.4Ghz/5.8GHz
Antenna directivity..... 15 dBi
Data Output to PC.....USB connection