airelectronics
UAV AUTOPILOTS

Remote Sensing Skywaker

Airelectronics has developed a new complete solution meeting the needs of the farming science.

The completely test Skywalkerplatform has been equipped with both thermal and multispectral cameras to measure breeding parameters, and the system has been adapted to match the remote sensing requirements.
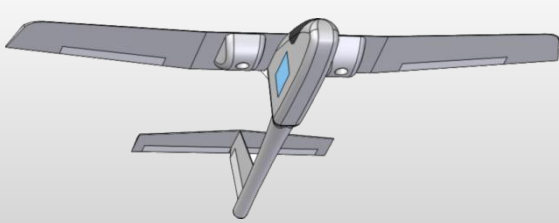
Remote sensing of fields is helping farmers all around the world improving their breeding yields. Measuring the plants growing state and the influence of water in them can help choosing the best seed for each field, considering soil substratum and other environmental characteristics. The Thermal camera on board the Skywalker measure the water stress of the plants, meanwhile the combined information of the thermal andmultispectral cameras provide the NDVI (Normalized Differential Vegetation Index).

To make this information compiling process easier, Airelectronics has developed and integrated some tools into its system, such as flight plan pattern designer and imagegeoreference data.

Using a standard computer, the user can design the flight plan, defining a zone to flyover and letting the software define thewaypoints. As in all Airelectronics systems, the user can modify the mission in real time,thanks to the U-Pilot flight control system and the U-See 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(1.3 kg without the payload) it is really easy to hand launch it and to land it: any operator can do it, even without any previous skill, and it will land on its fuselage without big damage in almost any terrain.UAV Remote Sensing Skywalker.

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 a payload. 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.

Its control laws has been optimized for the control of the electric motor the UAV Skywalkeruses, 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.
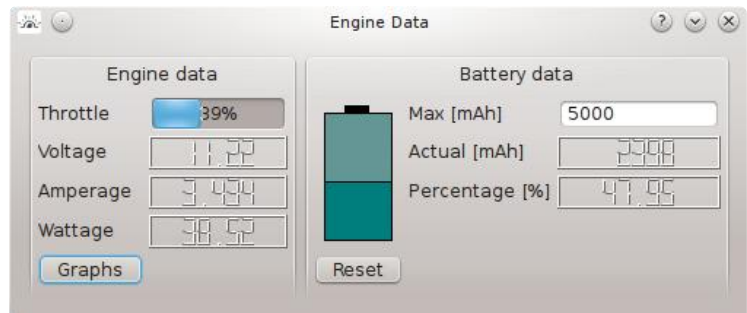

The system also monitors the amount of energy that came from the batteries and uses the batteries up to the point it is bingo time. Batteries packs are available from 5.000 mAh to 13.000 mAh

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.
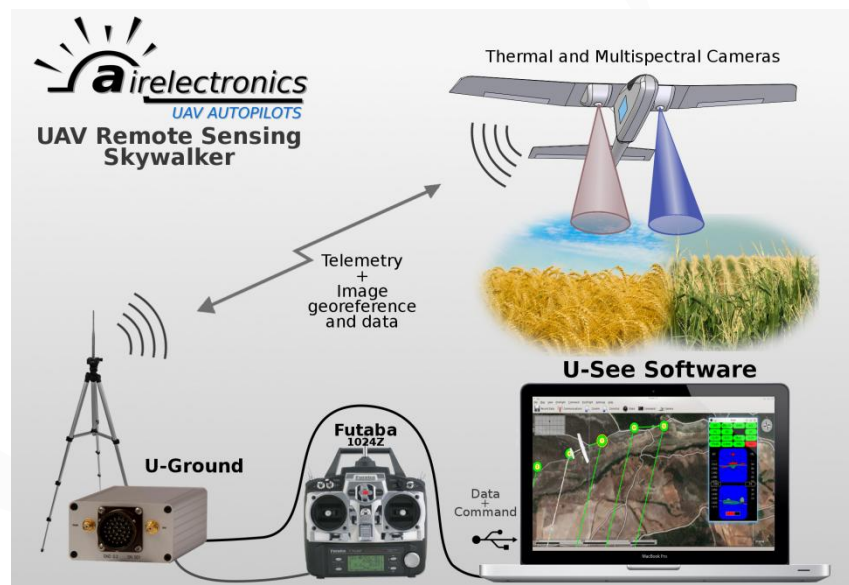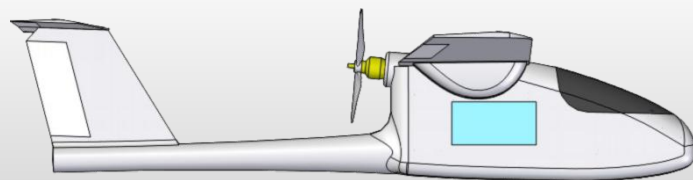
Remote Sensing Skywaker

Highlights

Thermal Soaring
Take advantage of the atmosphere energy

Fully autonomous
No human intervention required during flight

Multi-Payload
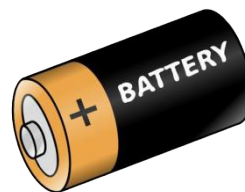The plane can accomodate a great number of payloads

Affordable
Unlike other solutions, the prices are reasonable

Hull renovation
We will supply you a new hull free of charge if yours is damaged

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

Real-Time Video Feed
Using a video transmitter you can receive real-time the video feed

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

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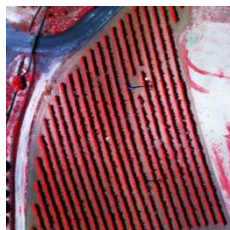The system can give geo-referenced images

Possible Applications

Border control
Survillance in terrestrial and maritime borders

Police Usage
Demonstration control, anti-drug operations
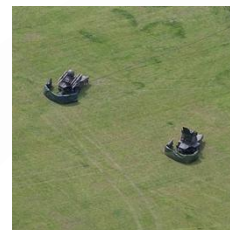

Agriculture
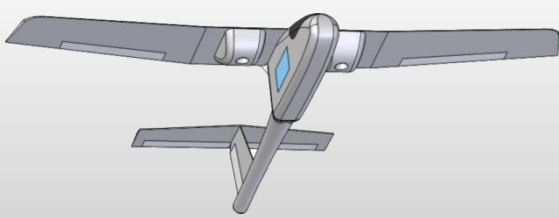Status of crops, Forest mass control, study of soil

Fire Fighting
Monitor Active fires, avoid reactivation of controlled fires

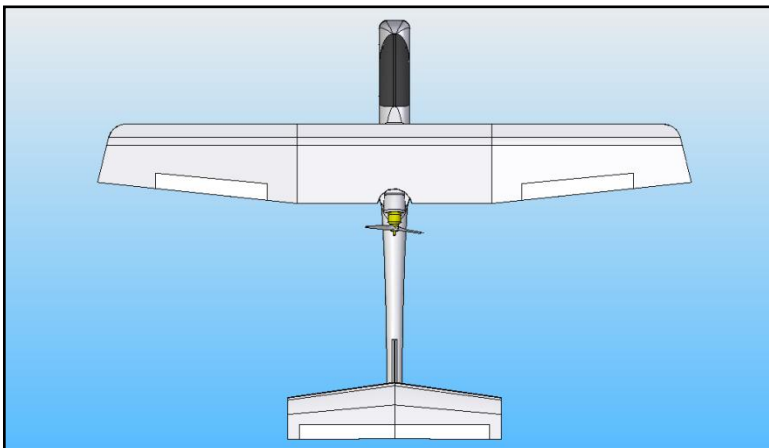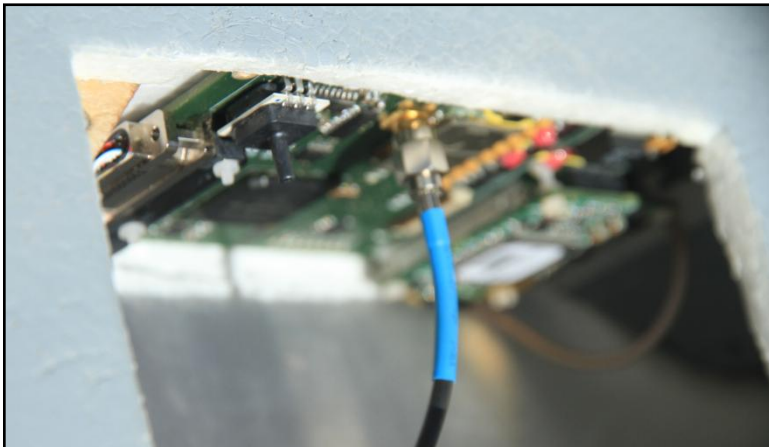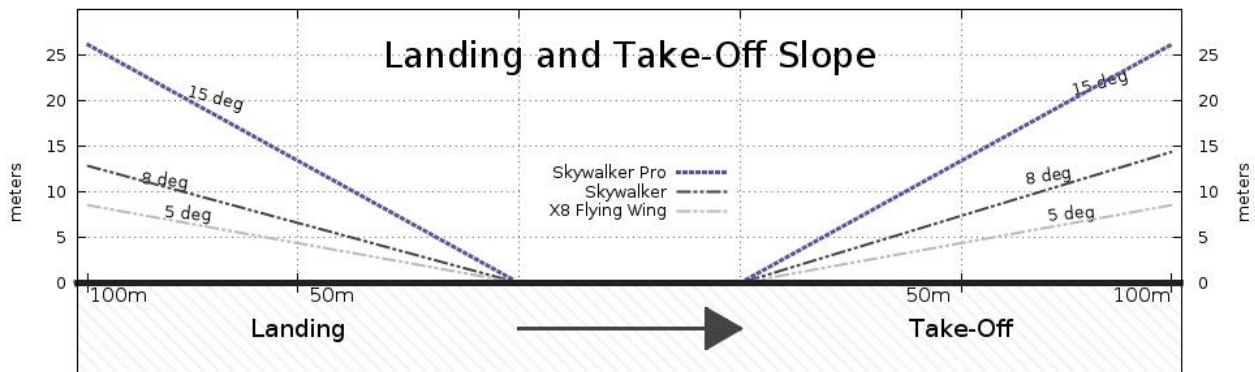### Military
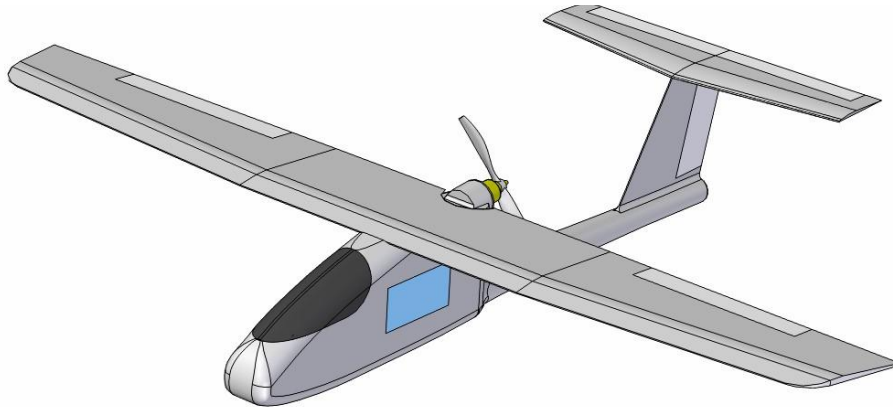Forward observer, over the hill recon missions

airelectronics
UAV AUTOPILOTS

Landing and Take-Off Slope

Skywalker Pro		
Skywalker		
X8 Flying Wing		
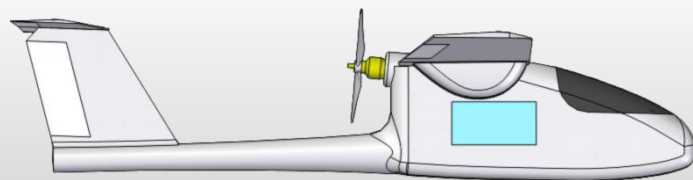
Landing → Take-Off

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

Cammera Control
Protocols......................... VISCA®, Controp & PWM
.... Other protocols upon request
Camera modes........... Geo-Pointed, Stable, Manual

Cameras

Thermal Camera................................. Miricle 307k
Multispectral Camera......................... ADC Camera

Minimum Hardware for Control Computer

The recommended hardware is the MacBook Pro 13" with BootCamp and Microsoft Windows 7.
OS... Windows or Linux
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)

Plane Specification

Dimensions
Length... 1100 mm
Wing Span............................... 1680 mm/1880mm
....(Two Options available)
Payload Bay.. 3450 cm^3

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

Endurance
5000 mAh battery option............. 30 min minimum
10000 mAh battery option............1 hour minimum
Long endurance battery option.... 2 hour minimum

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