



DESCRIPTION

This is a rotary wing VTOL (Vertical Take-Off and Landing) UAV (unmanned aerial vehicle) of medium size, moved by 4 rotors, able to bring “intelligently” and under safe conditions an up to 1 Kg payload over a some-kilometers area following a planned trajectory or according to manual commands.

An onboard embedded computer runs an high level control system able to react to unforeseen events, such as onboard failures and (optionally) obstacles detected by its sensors. The robotic flying platform can be equipped with different payloads/sensors to perform its mission, for example a standard video camera or infra-red camera, or other sensing devices. Stabilized and stationary flight makes it possible to iteratively and precisely acquire sensorial data.

Data collected onboard are sent through a wireless link to a ground station where an user friendly monitored from the ground station where a standard aerial mission planner tool runs both with a commanding and monitoring tool. The aerial vehicle is also equipped with a global positioning system (GPS) in order to absolutely locate the UAS and to tag every data collected with its absolute location in space.

Its onboard intelligence makes it able to execute its tasks under safety and security constraints, thus making it suitable also for a future UAV regulated aerospace area.



USER FRIENDLINESS

It's not directly remotely controlled as a typical UAV or as a typical model aircraft, but it is remotely operated, and in practice commands from the ground station are high level commands ("go up", "go down", move left" etc...) simply given by a joystick, that do not influence the onboard attitude control system. The onboard control system is able to interpret commands and execute them by means of position directives. In every moment attitude management and onboard safety is assured by the control system with its nominal and redundant channels.

Environmental awareness is kept by data collected from the sensor systems and real-time processed onboard. A skilled person is not required in order to manage a typical mission. A simple training program can teach to everyone how to fly with our aircraft by using its Ground Segment.

A typical mission can be supervised by a trained pilot that extracts the system from its portable bag, turns it on and by simple commands through the portable ground station and its running software manages flight and sensorial survey (less than 5 minutes from deployment to takeoff).

SAFETY

It's designed for safety according to prescriptions by the Italian CAA (Civil Aviation Authority) ENAC, with patterns derived from manned helicopters. It's designed following paradigms derived from commercial manned aircraft. Our aircraft is the first rotary wing UAV with an official Permit To Fly issued in the civil airspace.

DESIGN PATTERNS	FEATURES
<p><i>Design for:</i></p> <ul style="list-style-type: none"> • Easy Use • Safety • Assembly • Maintenance • Rapid Deployment • Noise Reduction • Easy Transport • Rapid Procurement • Environment 	<ul style="list-style-type: none"> • Controlled and Stabilized flight • Remotely operated by the ground station • Safety and autonomy in flight (path following, obstacles avoidance, fault management) • Automatic take-off and landing system • High precision in task execution • Simplicity for the operator • Easy to maintain • Artificial Intelligence based Control System Independent from the mechanical platform

GROUND STATION

- Integrated Rugged PC with user friendly UAV planning, commanding and monitoring software
- UAV Flight control sticks
- Touch screen mission planning
- Aural warnings
- Integrated digital video receiver
- Advanced data-link
- Video controls
- Data logging and offline mission playback





AIRCRAFT

SERIAL NAME	MINI	MICRO
ROTOR DIAMETER	45 cm	30 cm
TAKE-OFF WEIGHT	Less than 5 kg	Less than 2 kg
PAYLOAD	1 kg	300 g
EXTERNAL DIMENSION	100 cm x 100 cm x 30 cm	70 cm x 70 cm x 30 cm
ROTOR ENGINE	Brushless	Brushless
ONBOARD POWER	LiPo Batteries	LiPo Batteries
MAXIMUM FORWARD FLIGHT	10 m/s	5 m/s
MAXIMUM ALTITUDE	120 m Agl (not a technical limit but bounded by Italian CAA rules)	120 m Agl (not a technical limit but bounded by Italian CAA rules)
FLIGHT TIME	More than 30 minutes	More than 20 minutes
ACTION RADIUS	7 km	3 km
WIND SPEED	10 m/s	5 m/s
CONSTRUCTION	Carbon fiber composite	Carbon fiber composite
NAVIGATION	GPS + INS	GPS + INS
PILOT MODES	Manual / Automatic	Manual / Automatic
RADIO LINK	2.4 Ghz	2.4 Ghz
AUTOMATIC FUNCTIONS	Take off, Landing, Safety Procedures in case of failure, Way Point following, Hovering, Loitering, Avoid obstacles, Perch-and-stare, Situation Awareness	Take off, Landing, Safety Procedures in case of failure, Way Point following, Hovering, Loitering, Avoid obstacles, Perch-and-stare, Situation Awareness
PILOTING REFERENCES	UAV, Ground Station and other according to application (International Patent Pending)	UAV, Ground Station and other according to application (International Patent Pending)
ONBOARD PAYLOAD	Video (other payload optional)	Video (other payload optional)

SERVICES	METHODS
<ul style="list-style-type: none"> • Training programs (operation and maintenance courses) • After sales support • Ordinary and extraordinary maintenance • Replacement in breakdown event • Optional Payload Integration (option for customization, with processing algorithms integrable on-board) • Mission Data Management extension (Ground Segment add-on modules design and development) 	<p>All the data acquired by sensors (payloads) might be subject by one or more of the following methods:</p> <ul style="list-style-type: none"> • Digital signature • Time stamping • Encryption <p>Content management system (archive, tagging, possible data mining, search criteria) for immediate use and for further processing</p>



PAYLOADS AND APPLICATIONS

Payload user interchangeable without tools:

High Definition Video Camera

Daylight / night Video Camera

High Resolution Photo Camera

Spectroradiometer and multispectral camera

Thermal Camera

Range Camera, to produce range images for Digital Elevation Map (DEM) & Digital Surface Model (DSM)

Sniper Fire Real Time Detection and Localization (Sf-Rtdl)

suitable for the following applications:

Aerial Video photography and Documentation

Geomatics

Environmental Preservation

Surveillance & Security

Structural Inspections & Monitoring

Measurements for environmental monitoring

Fire Management Support

Law enforcement