WB AMERICA
WB GROUP

FLYEYE

Unmanned Aerial System

About WB America

WB America is a dynamic modern engineering company focused on developing Unmanned Aerial Systems to provide observation and reconnaissance capabilities in both the defense and civilian markets. Founded in 2008, the company has seen rapid success and now supplies the NATO Forces Artillery, Special Forces, and the Border Guards with the FlyEye mini UAS. In the last year, WB America has developed the first short range tactical class fixed wing UAV to have VTOL capabilities.

FLYEYE

FlyEye is a mini Unmanned Air System (UAS), that is used for intelligence, reconnaissance, and surveillance of the battlefield, sensitive areas, national borders, natural disasters, or large public events.

The reliability and usability of the FlyEye System, have been tested and proven during many field evaluations around the world, as well as during active service in combat zones with the NATO Armed Forces. The system has been subject to field evaluations during both day and night and in extreme environmental conditions such as high wind, high and low temperatures, increased humidity and altitude changes.

HD Surveillance

Visual data is provided by an observation head mounted on the underside of the fuselage of the UAV. FlyEye is compatible with three different gyro-stabilised heads. The GS2 observation head that integrates both a standard definition daylight (EO) and infrared (IR) camera, the GS3 observation head, available either with a single high definition EO or IR camera, and the GS4 head that comprises HD daylight camera, IR camera and laser target highlighter.

The observation heads are gyro-stabilised in both the PAN and the TILT axes and have a full 360 degrees of continuous horizontal and vertical motion. The movement of the head and camera zoom features are entirely controlled by a user at the ground control station. Also, further image stabilization is provided by post data collection processing using software that is installed on the ground control station.

The GS3 and GS4 observation heads incorporate a "Target Lock" function, which allows the camera to observe a target area or object regardless of the orientation of the UAV. Target locking is achieved based on the geographical position of the target and unique features of the object, such as shape and colour. Target locking enables tracking of individuals or vehicles at either day or night.

Battlefield Assessment

The observation head allows for the battlefield assessment of both vehicles and humans.

	GS3-EO	**GS3-IR**	**GS4**	
camera	HD Video	Thermal	HD Video	Thermal
sensor type	CCD	ASi, LWIR	CCD	VOx, LWIR
resolution	HD 1280 x 720	640 x 480	HD 1280 x 720	640 x 480
optical zoom	x 30, continous	N/A	x 30, continous	N/A
video output	digital	digital	digital	digital

User friendly

The FlyEye Mini Unmanned Aerial System allows for Intelligence, Surveillance and Reconnaissance missions. However, the system can be used for any activity requiring the rapid gathering of information.

Flight Modes

Automatic Take-off	Controls the air vehicle until it reaches a safe altitude before switching to the flight plan mode.
Flight Plan	An automatic flight following way points according to a flight plan made of a set of defined geographic locations named waypoints. The path that is followed by the UAV can be modified at any moment, both prior and during the mission.
Semi Manual	Control by the operator. The camera angle is fixed pointing forwards and the operator controls the flight direction of the AV. Turns are controlled by the autopilot ensuring that operation is within safe boundaries. For enhanced safety, this mode automatically switches down if there is no operator input for a certain amount of time.
Convoying	A Special convoy mode permits operation with a mobile antenna fixed to a vehicle. During this mode, the on-board autopilot predicts the direction of the convoy and adjust the flightpath of the FlyEye UAV to stay in front of the vehicle.
Camera Guide	The AV moves in the direction that the camera is facing. This mode is especially useful for following moving targets.
Return	FlyEye has an automatic return feature in the case of a communication break between the UAV and the base station. The Return procedure automatically commences if communication between the base station and the UAV is lost for a period of time defined by the user. Return mode ensures recovery of the UAV in case of failure.
Landing	Initiates the landing of the AV at a pre-determined landing point.

Ground Control Station

Control Stations

The FlyEye ground control station (GCS) is lightweight and may be transported in a single backpack, allowing for easy deployment of the air vehicle (UAV). The GCS comprises a rough book laptop and digital radio link that allows for both the control of the UAV, and the receiving of telemetric data from the UAV.

Remote Video Terminals

Any number of RVT (Remote Video Terminals) can receive a signal from the UAV providing flight status and data from the on-board UAV sensors.

Commander

The "Commander" user-friendly software installed on the GCS is as a result of continuous feedback from multiple different customers. The Software enables full control of both the FlyEye UAV and the attached payload during a mission. An operator can easily plan and execute a mission and monitor the UAV at the same time.

The software has an in-built data analysis system enabling accurate identification of targets detected by the payload mounted on the FlyEye UAV. During a mission, it is possible to control the UAV from a different GCS in an emergency situation where, for example, there is damage to the GCS hardware.

A complete mission is logged and saved in the GCS permitting the playback and analysis of mission events at a later time.

Antenna Systems

Regular & Maritime	**30 km**	High-gain directional antenna system. Allows for long distance flights on land or over shore.
Mobile	**10 km**	Medium range antenna system. Allows for control of the UAV from a moving vehicle.
Portable	**10 km**	Medium range light antenna system. System fits into tactical backpacks.

Rapid deployment

Tactical backpacks

The minimal set of the FlyEye UAV can be carried by two soldiers using a set of backpacks. Each backpack is designed to transport part of the FlyEye Set and allows for the attachment of additional personal soldier equipment. In the case of an emergency, the UAV components can be de-attached from the rest of the backpack.

Transport system

The FlyEye UAS can be stored in two transport backpacks allowing for fast deployment. An operating team can assemble the air vehicle in under ten minutes. System comes in heated hard cases which allows for transport by military airplanes.

Take-Off

A fully automated launch procedure is followed by a series of pre-flight tests to ensure full functionality of the system. The UAV is hand launched, and the FlyEye aircraft will rapidly climb to a chosen flight altitude before switching to the desired flight mode.

Landing

The FlyEye UAV lands automatically at any pre-determined point following the selection of the landing mode. The payload is released from the airframe immediately before landing, together with a parachute, preventing damage to the camera and allowing the UAV to land on a hard surface if required. The UAV will land within a 25 m radius from the payload. Typically, a minimum of a 50 x 50 m and a 100 x 100 m open space are required for launch and landing of the UAV, respectively.

Long term support

Maintenance Levels

O-level or operational level is ongoing maintenance in the field to repair minor damage to the AV. Each UAV has a toolkit provided and part of the training program enables the user to understand how and when to carry out minor repairs.

I-level or intermediate level is the repair and maintenance of more serious damage or faults with the AV. This can be carried out by Flytronic or be assigned to a third party, who will receive training from Flytronic engineers, depending on the requirements of the user.

D-level or depot level is an overhaul of the AV that must occur every 200 flights, and is carried out by Flytronic.

Training

FlyEye mini UAS, is an intuitive and easy to learn system, that is designed to be used by operatives without any previous aviation or UAV experience.

WB America provides a two-week tailored program, which consists of lectures, simulation training, and live operation of the UAV. All training is computer aided and instructor led. Trainees undertake a series of exercises so as to become accustomed to multiple different flight scenarios.

Multiple Safety Levels

Automatic return

FlyEye has an automatic return feature in the case of a communication break between the UAV and the base station. The Return procedure automatically commences if communication between the base station and the UAV is lost for a period of time defined by the user. After passing this time point, the UAV will start to fly towards a pre-defined emergency landing position (which does not have to be the position of the GCS). Above the landing site, the UAV will circulate before the automatic landing procedure commences. If during the automatic return, connectivity between the base station and AV is restored, the operator can interrupt the return procedure and continue a mission. The auto-return feature is optional and may be switched off if desired.

Time to return

The on-board autopilot constantly calculates the time of flight remaining before the return mode must be initiated based on a variety of factors such as wind direction and speed, altitude of the AV, and position of the landing site. The remaining time is termed “Time to Return” and is displayed at the GCS. If the “Time to Return” reaches zero, the AV automatically initiates the return flight mode and proceeds to the landing position. However, if required, the operator can cancel the auto-return and continue the mission, for example, in a situation when accomplishment of the mission has top priority, and loss of the air vehicle is acceptable.

Spin and stall recovery

The air vehicle is able to detect stall and spin allowing the autopilot to correct the movement of the aircraft so it may return to normal flight. Stall or spin may appear due to turbulence or wind shear, especially during a turn at low speed. After recovery to a normal flight condition, the mission is continued according to the flight plan.

Speed sensor failure

The air vehicle is able to detect the failure of the dynamic pressure sensor, which is used to measure air velocity. Either the freezing or clogging of the Prandtl tube may cause such a failure. After detecting the failure, the flight is continued at a constant angle of inclination without speed stabilization. A speed sensor failure is indicated on the GCS.

Operation without GPS

FlyEye mini UAS is capable of operating in GPS denied environment.

In case of GPS jamming or failure, the system automatically engages a precise odometric navigation subsystem that computes the UAV location taking into account the position at which the GPS failed, wind speed, wind direction, and magnetic field data. The operator is informed about the situation, and can either continue the mission or return to a predefined location in order to perform an emergency landing.

Technical Specifications for FLYEYE UAV

length	1,8 m
wingspan	3,6 m
payload mass	< 2,0 kg
maximum take-off weight	11 kg
endurance	150 min
max wind speed at take off	12 m/s
max wind speed at operation	18 m/s
max ceiling	3500 m AMSL (limited to 1000 m AGL)
launch method	hand launched, no equipment required
recovery method	Fully autonomous detachable container (battery and payload) lands with the parachute, the UAV itself lands controlled by the autopilot until the stall/touchdown at 0 altitude. Whole procedure is fully autonomous controlled by the flight computer.
number of personnel needed	2 persons
target acquisition accuracy	better than 25 m CEP
landing accuracy	better than 25 m CEP
guidance method	Fully autonomous mode: the operator defines the waypoints on the digital map that UAV is following. Camera guided modes: UAV follows the camera line of sight. Semi-manual mode: UAV flight direction is controlled by the operator using joysticks – the autopilot is in charge of providing the mission safety (mode useful for flights without GPS).
personnel needed for ground station operation	1 person (with the optional data analysis station another 1 person is required).
data link range	30 km Line of Sight (data transfer in real time) Ability to perform the mission beyond the reach of radio. (Video recorded on-board can be downloaded after mission)
mobility features	Available as an option. Mobile version of the ground communication unit is installed along with the GCS onboard the base vehicle. The radio link range is 10 km. Additional mode of convoying is available (UAV automatically follows the route ahead of the moving vehicle).
multiple UAV options	It is possible to operate multiple FlyEye vehicles from a single GCS providing that all AVs are within line of sight.
payload options	**GS2-UM** Dual core (EO and IR). The daylight camera has 10x optical zoom. The fixed lens thermal camera operates within the 7-13 micrometer range. The payload has two axes gyroscopic stabilizer. **GS3-DL** High definition daylight camera with x30 optical zoom. The payload has two axes gyroscopic stabilizer. System uses advanced software stabilization of the video. **GS3-IR** Fixed lens thermal camera within the 8-14 micrometer range. **GS4** Dual core (EO and IR). Also includes a laser highlighter
operational frequency	C Band – both uplink and downlink. Radio link communication is encrypted with AES-CCM 128 with pre-shared keys.
remote video terminals	Real time video and mission data received directly form the UAV. Any number of RVT can be used simultaneously.

wb-america.com

WB AMERICA
WB GROUP

1800 Diagonal Road Suite 600
Alexandria, VA 22314

T: +1 571 366 1772

info@wb-america.com