

TECHNOLOGY DIFFERENTIATORS

“We’re focused on using machine learning to bring the longevity of fixed wing aircraft to the commercial arena with the simplicity of operating a multi-rotor UAS, with a reliability that far exceeds current solutions.”

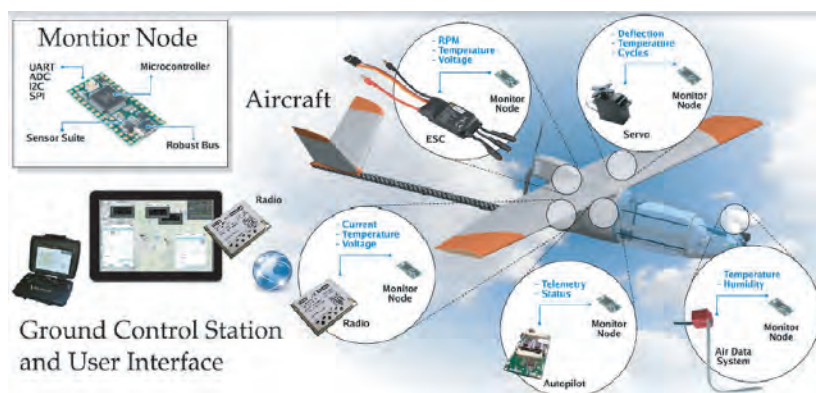
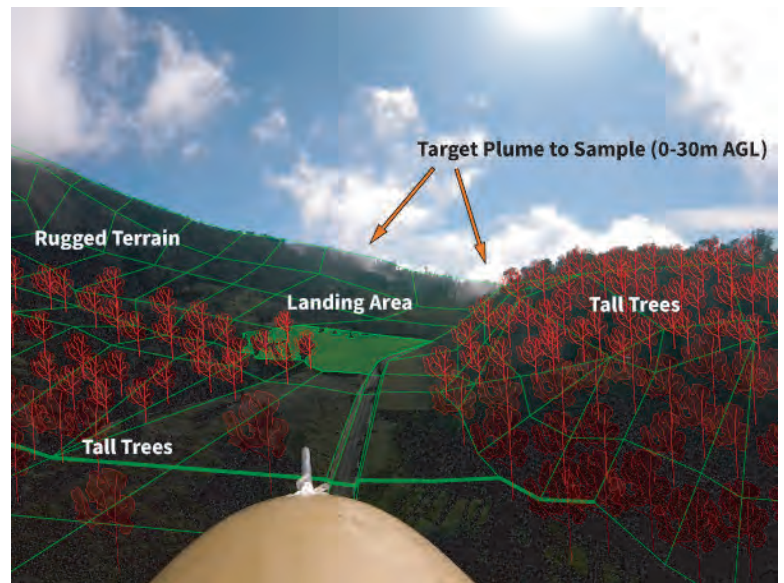
Jack Elston, PhD
 CEO and Founder
 Black Swift Technologies

Data-Centric Flight Control

The quality of your data capture relies on the accuracy and reliability of your systems’ autopilot.

Black Swift Technologies’ SwiftCore™ Flight Management System (FMS) is a payload-focused control system enabling real-time telemetry and control through its autopilot data link. By autonomously modifying flight paths based on sensor inputs, operator workload is minimized while the quality of the observed data is enhanced. This advanced end-to-end avionics solution allows you to control, communicate, and command your Unmanned Aerial System (UAS) for fully autonomous flight.

As a data-centric control system, SwiftCore™ addresses the key dependencies for optimal data/image capture including: the density and consistency of image overlap, overall platform connectivity and the ease of flight planning and execution.



Black Swift Technologies (BST) is developing a highly capable avionics subsystem designed to improve UAS robustness through augmented onboard intelligence via a networked modular system for automated fault detection and mitigation. The system uses regression and classification techniques to identify both inflight failures, and track maintenance requirements.

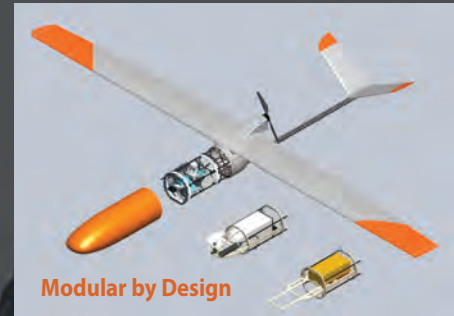
“The flight management software BST has developed is absolutely brilliant! It feels pretty idiot-proof. The fact that the S2 can fly so autonomously is just tremendous.”

Bruce Vaughn
 Institute of Arctic and Alpine Research

Modular Field-Swappable Payload System

Indicative of its science-based missions and flight heritage, the Black Swift S2 UAS features a unique modular field-swappable payload system designed to:

1. Ensure clean and uncontaminated atmospheric measurements by positioning the sensor suite and associated hardware in front of the propeller, in the nose cone of the aircraft, and
2. Enable rapid changes of the payload in the field using a common power, data, and mechanical interface without any specialized tools. This allows for calibration of the payload in the field separate from the aircraft.



As a result of its standardized interface, users can quickly and easily integrate new sensing payloads—in the lab or in the field.

Black Swift Technologies has incorporated modular payload sensors for a variety of specialized applications including Soil Moisture Mapping (L-band radiometer), Wildfire Monitoring (CO₂, CO, aerosol, RH, p and T trace gas sensors, multispectral camera), Multi-Angular Remote Sensing (531nm band monitor, Tetracam Mini-Multiple Camera Array Imaging System, multispectral camera), Volcano Monitoring (CO₂ trace gas sensor, nephelometer, temperature, pressure, humidity and wind sensors), to name just a few.

Accessibility and flexibility are further complemented by Black Swift's advanced end-to-end avionics solution (SwiftCore™ Flight Management System), which enables real-time telemetry and control through autopilot data link allowing for sensor-based fully autonomous flights.

On-Board Augmented Intelligence

System failures can be costly—in time, money and equipment. Black Swift Technologies (BST) is developing a highly capable avionics subsystem with associated machine learning algorithms to provide early warning and diagnostics of potential failures of critical systems on small UAS. BST's intelligent fault detection can predict system failures before they happen.



This system for on-board augmented intelligence could quickly respond to propulsion failures requiring remote and autonomous landings.

The goal of this technology is to aid in enabling ubiquitous operations of UAS in the national airspace. This includes beyond-line-of-sight operations (BVLOS), flights over populated areas, and fully autonomous operations without direct human oversight.

More reliable UAS are essential for making a safety case with the FAA to allow new types of missions. Reducing failure likelihood due to consistent maintenance and improving flight anomaly detection and mitigation will be important factors in enabling BVLOS operations and eventually fully autonomous flights without direct human oversight. Black Swift's system allows for active navigation around obstacles and rugged terrain by fixed-wing UAS.

By making UAS operation safer for both operators and the public, BST can help serve as a catalyst for accelerating UAS growth and adoption. The compact form factor of this technology allows it to be incorporated into a wide variety of UAS platforms—enhancing the aircraft's reliability while allowing for active navigation around obstacles and rugged terrain, thus reducing adverse impact to either people or property.

AI Systems provides:

- Hardware and firmware for individual subsystems that includes sensor and machine learning algorithms to track aircraft subsystems.
- Uses regression and classification techniques to identify both inflight failures, and track maintenance requirements.
- Perform automatic mitigation as needed from failures and guide the user through failures with an "ECAM-like" system.