

RADAS:

RADAS leverages previous and current INL developed component technologies including, a direct geo-referencing system and advanced UAV operations as well as, developing new capabilities. Imaging Sensor, Raptor Eye Image Trigger Method, Wireless Image Transmission, Ground Station/Mission Planning, Automated Georeferencing, RADAS Flight Testing with Payloads at the INL

Image Sensor: A state-of-the-art Prosilica GE 4900 C 16 Mega pixel Digital Camera is used for the RADAS image sensor. The resolution of the imagery, the ability of the sensor to collect multiple successive images in a short time, the ease of integration into our system, and the size and weight of the sensor. The camera captures images and sends them to onboard Raptor Eye Processor to prepare them for wireless transmission.



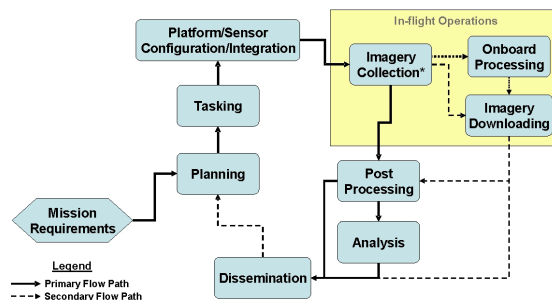
Raptor Eye Image Trigger Method: The improved image trigger scheme incorporates Airborne Innovations Raptor Eye and software and integration changes by Cloud Cap Tech and INL. At the same time the system records the aircraft attitude and position then tags the image with the data.

Wireless Image Transmission: RADAS is equipped with a state-of-the-art wireless network and achieves real-time wireless data retrieval of large data files. This provides the capability of real-time downloading of all images or any specific image during flight.

Ground Station/Mission Planning: Mission Planning includes the creation of flight paths based on assessment needs, sensor characteristics, and mission goals. INL developed, integrated and streamlined a flexible process usable by trained operators.

Automated

Georeferencing: Direct georeferencing is the process of registering an image frame to a map coordinate system through the direct measurement of the image exterior orientation parameters by a GPS (Global Positioning System) and IMU (Inertial Measurement Unit) at the moment of exposure, as well as the incorporation of a pre-defined sensor model of the sensor's interior orientation parameters. Initial results suggest that image registration provides the positional accuracies for change detection applications.



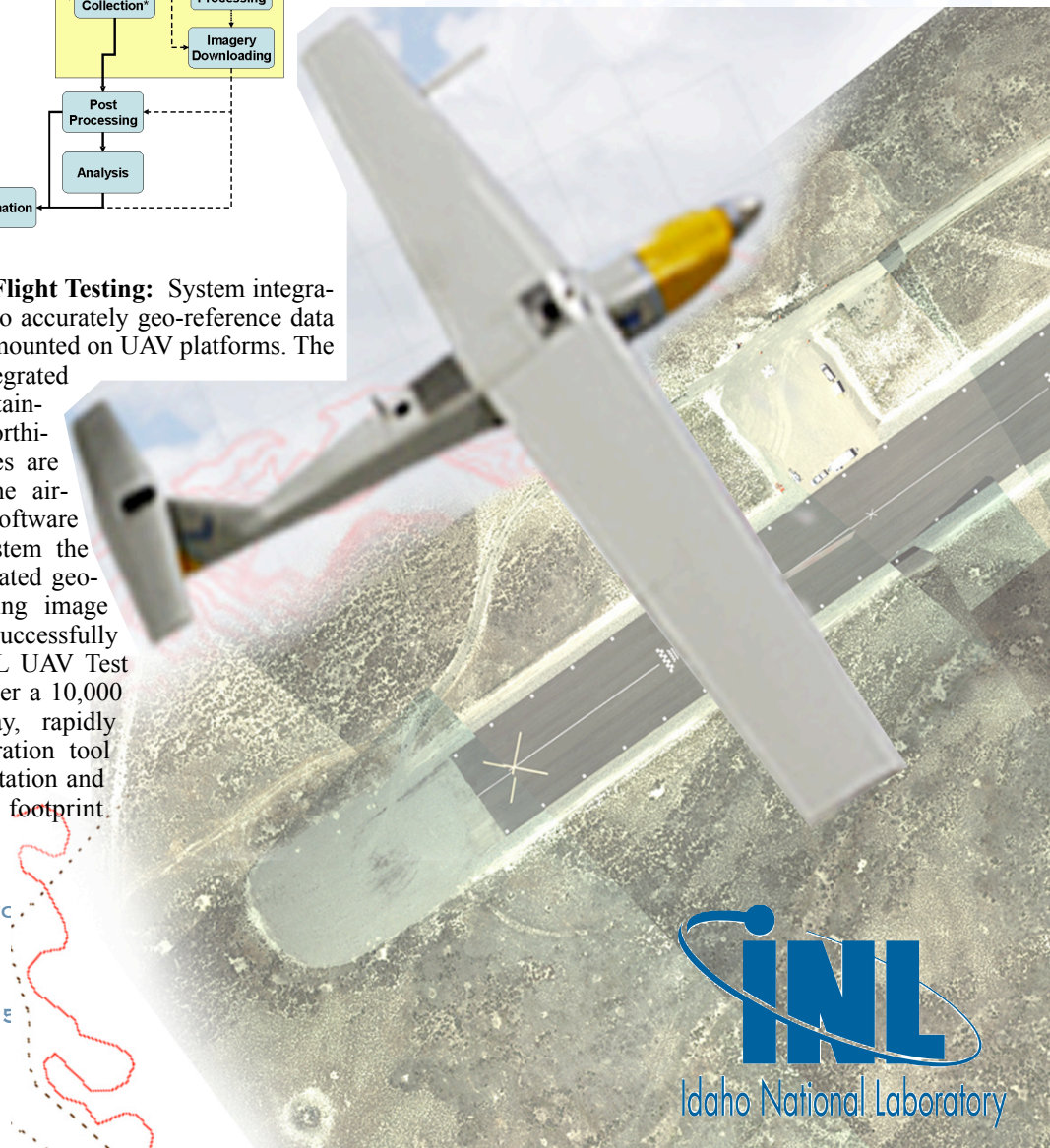
T-15 UAV Integration and Flight Testing: System integration requires careful design to accurately geo-reference data collected by sensor systems mounted on UAV platforms. The image sensor must be integrated into the airframe while maintaining its integrity and flight worthiness. The autopilot features are controlling and directing the aircraft, the mission planning software is feeding the autopilot system the correct paths, and the automated georeferencing software is doing image post-processing. INL has successfully Conducted test flights at INL UAV Test Range collecting imagery over a 10,000 ft x 2000 ft simulated runway, rapidly developed flight path generation tool and integrated with ground station and provided real-time image footprint visualization.

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AERIAL IMAGE EXPLOITATION WITH RAPTOR EYE FOR RAPID AIRFIELD DAMAGE ASSESSMENT

RADAS



INL Image EXP

Raptor Eye



RADAS

Rapid Airfield Damage Assessment System



U.S. AIR FORCE



The INL [TITLE] UAV Programs has developed a small unmanned aerial vehicle (UAV) based system for rapid, accurate, and safe collection of ultra high-resolution geographically referenced aerial imagery. Utilizing a 16 mega pixel camera, ultra high-resolution images are captured from an altitude of 800 to 1000' and in near real-time wirelessly streamed to a ground based operating interface where each image is automatically mosaiced into a single geo-referenced map.

The system was designed in direct response to the Air Forces need for a rapid airfield damage assessment immediately following a strategic attack on an airfield or upon initial evaluation of an enemy airfield. An airfield damage assessment survey is typically conducted by two 3-man Airfield Damage Assessment Teams (ADATs) navigating by vehicle and requires 1 to 1.5 hours on average to complete the assessment. This method exposes valuable personnel to a potentially hostile environment.

Building upon our, [UAV and imagery] experience the Rapid Airfield Damage Assessment System (RADAS) was developed to demonstrate the concept that geographically referenced ultra high-resolution imagery can not only be collected from UAV platforms but also be processed in near real-time for rapid assessment. RADAS provides a complete solution that rapidly and accurately delivers the necessary information while keeping cost and risk to personnel at a minimum.