DISCUSSION ARTICLE · AERIAL INVESTIGATIONS

Eyes in the Sky:

How UAS Drone Operations Are Reshaping Modern Investigations

A field perspective from Alden Wheeler Detective Agency & GPS

SC SLED-Licensed Private Investigator | FAA Part 107 Remote Pilot

There is a moment, just after the rotors spool up and the airframe lifts off the launch pad, when a complicated case suddenly becomes a smaller problem. From three hundred feet, a tangle of woods becomes a search grid. A roadway becomes a measurable plane. A property line becomes a coordinate. For a SLED-licensed investigator who also holds an FAA Part 107 Remote Pilot Certificate, the unmanned aerial system is not a gadget — it is a force multiplier that turns hours of fieldwork into minutes of flight, and it is changing the way private investigations are conducted in South Carolina.

The Investigator-Pilot: A Combined Skillset

The State Law Enforcement Division (SLED) regulates private investigation in South Carolina under Title 40, Chapter 18 of the South Carolina Code. To carry credentials, an investigator must demonstrate experience, undergo a background check, and operate within the boundaries of state law — including the privacy and surveillance limits set by S.C. Code § 16-17-470. To put a drone in the air for any work product that contributes to a paying client's case, that same investigator must also hold a Remote Pilot Certificate under 14 CFR Part 107, the Federal Aviation Administration's small unmanned aircraft rule. South Carolina has no separate state-level drone licensing scheme for commercial flight; FAA Part 107 governs.

That dual credentialing matters. SLED licensure makes the work product admissible and the investigator accountable to a state authority. Part 107 makes the flight legal. Together, they let an agency like Alden Wheeler Detective Agency & GPS approach a case with two complementary toolsets: the legal and procedural rigor of a sworn investigator, and the airspace, weather, and risk-management discipline of a certified pilot. Neither half is optional. A clean photograph from an illegal flight is not evidence — it is a liability. A perfectly legal flight that violates a subject's reasonable expectation of privacy is, similarly, a problem looking for a courtroom.

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Search and Rescue: When Time Is the Adversary

The first time most investigators hear a drone justified in plain language, it is during a search-and-rescue (SAR) callout. The math is simple. A trained ground searcher walking a wooded grid line covers roughly

two to three acres an hour and is limited by daylight, terrain, and fatigue. A small UAS equipped with a high-resolution visible camera and a thermal payload can cover that same two to three acres in under five minutes, return to launch, swap a battery, and continue. For a missing child, an at-risk adult, or a hunter who has not checked in by sundown, that ratio is not academic. It is the difference between a successful recovery and a body recovery.

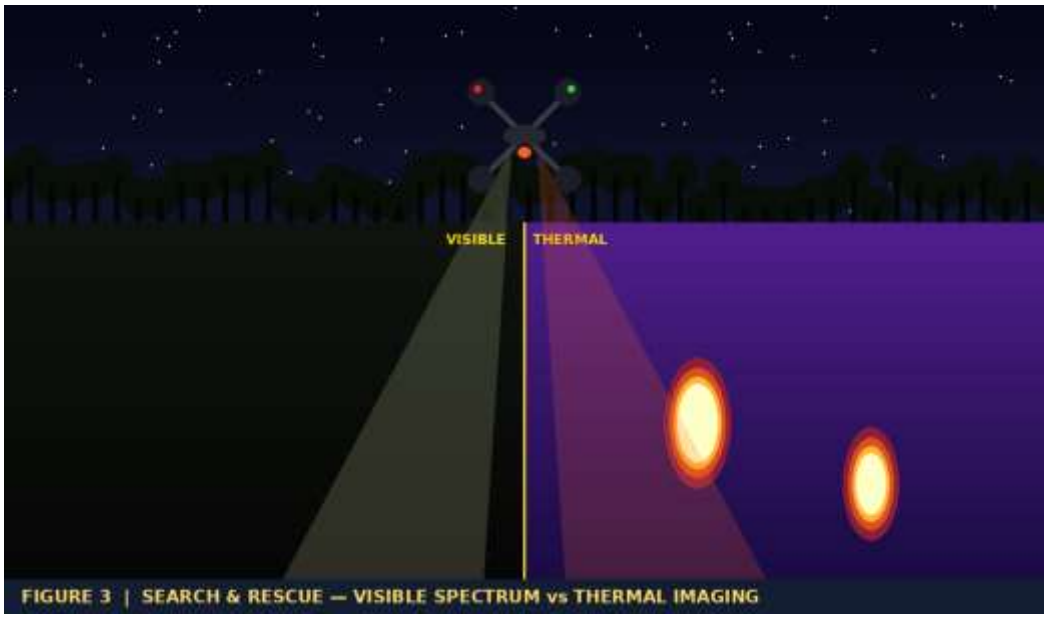

Figure 3 — Side-by-side illustration of a UAS conducting a nighttime search using both visible-spectrum and thermal imaging. Heat signatures from a body or an idling vehicle stand out clearly against a cool background, even in dense cover.

Thermal imaging is the workhorse of nighttime SAR. Mammals — humans included — radiate heat at wavelengths a long-wave infrared sensor can detect through light vegetation, smoke, and total darkness. In Upstate South Carolina, where deciduous canopy thins out from late November through early April, a thermal-equipped drone can frequently locate a downed subject in minutes that would take a ground team hours. During leaf-on months the picture is harder, but heat plumes still rise through gaps, and a methodical grid pattern flown at the right altitude will frequently catch them.

It is worth being honest about the limits. Thermal does not see through roofs. It does not see through standing water. It is degraded by direct solar loading on rocks and asphalt during daytime hours. A pilot who treats thermal as a magic wand will miss subjects. A pilot who treats it as one more disciplined tool inside a planned grid will find them.

Aerial Investigations: Perspective That Changes the Case

Beyond SAR, the bread and butter of investigative drone work is what we at Alden Wheeler call “the perspective problem.” Standing on the shoulder of a roadway, an investigator photographing a collision sees the scene from one height, one angle, one moment. The defense attorney sees the same scene from a different height, a different angle, and a different time of year. The jury, eventually, will see whichever

set of photographs survives a motion in limine. Aerial imagery solves the problem by giving every party the same orthographic reference — a top-down view tied to GPS coordinates that nobody can credibly dispute.

Workers' compensation surveillance, premises liability documentation, fraud investigations, missing-property cases, post-storm damage assessments, and contested property-line disputes all benefit from elevated documentation. So do AOI (area-of-interest) sweeps in domestic cases, where a single overflight of a publicly visible property can establish whether a vehicle is regularly present, whether structures match a subject's representations, or whether a claimed condition (a swimming pool, a workshop, a livestock operation) is consistent with the record. None of this requires entering private airspace below the navigable threshold or peering into an enclosed yard. Done correctly, it is documentation of what is already visible — just from a vantage point that ground photography cannot reach.

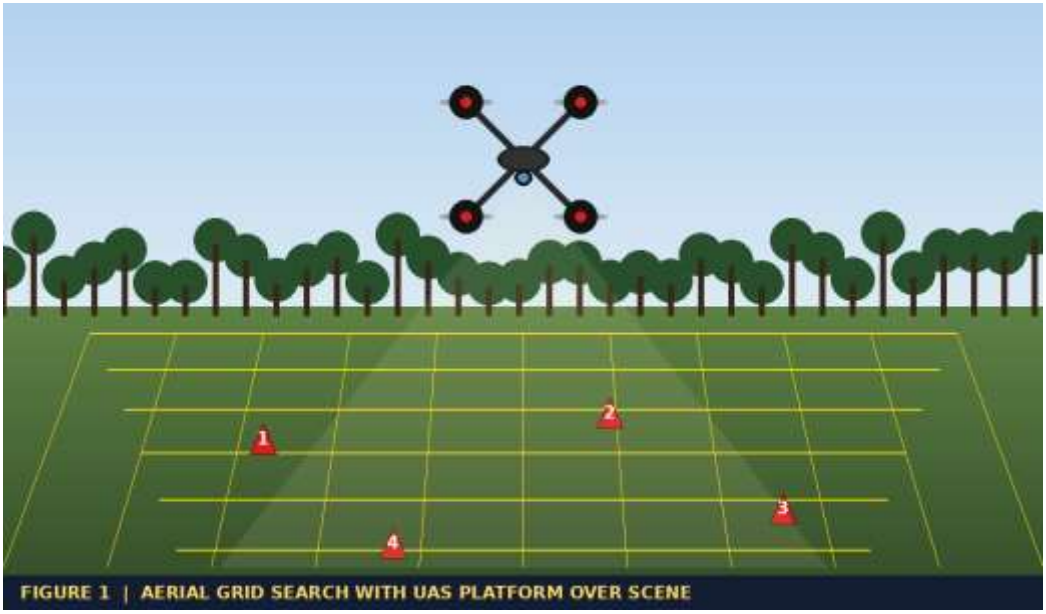

Figure 1 — A UAS platform conducting an automated grid search over a wooded scene with marked evidence locations. Yellow grid lines represent pre-programmed flight paths designed to ensure complete coverage with consistent overlap between passes.

The Grid Search: Discipline, Not Improvisation

A grid search flown by drone looks effortless to an outside observer. A small aircraft tracks back and forth above a defined polygon, executes a turn, and tracks back the other way. What the observer does not see is the planning that preceded the flight: the AGL altitude calculated from the desired ground sample distance, the side-lap and front-lap percentages chosen to support photogrammetric reconstruction, the wind correction applied to keep the lines straight, the airspace verification through LAANC if the area falls inside controlled airspace, and the pre-flight checklist that confirms the aircraft is airworthy and the pilot has filed everything required.

On a typical evidence-recovery grid — say, a half-acre wooded clearing where a missing firearm is believed to have been discarded — a flight plan might call for the following parameters:

- Altitude: 80 to 120 feet above ground level, balancing detail against coverage.
- Forward overlap: 80% between successive frames along the flight line.
- Side overlap: 70% between adjacent flight lines.
- Ground sample distance: roughly 0.5 cm per pixel, sufficient to identify a small metallic object.
- Camera angle: nadir (straight down) for photogrammetric work; oblique for visual inspection.
- Total time on station: typically eight to twelve minutes per battery, two batteries for a half-acre grid with thorough coverage.

The discipline of a real grid — as opposed to flying around looking at things — is what produces evidence that holds up to cross-examination. A defense expert reviewing flight logs and image metadata can quickly tell whether an investigator flew a planned mission or wandered. When the flight was planned, the work product survives scrutiny. When it was improvised, it usually does not.

Photogrammetry: From Photographs to Measurements

If aerial imagery solved only the perspective problem, drones would already be worth their weight in any investigative practice. Photogrammetry takes the value an order of magnitude further. By using overlapping images of the same ground from many angles, modern software solves for the three-dimensional position of every recognizable point in the scene. The output is not a picture. It is a measurable model — a georeferenced point cloud and textured mesh that an investigator, an attorney, an insurance adjuster, or an accident reconstructionist can interrogate at will, months or years after the scene has been cleared.

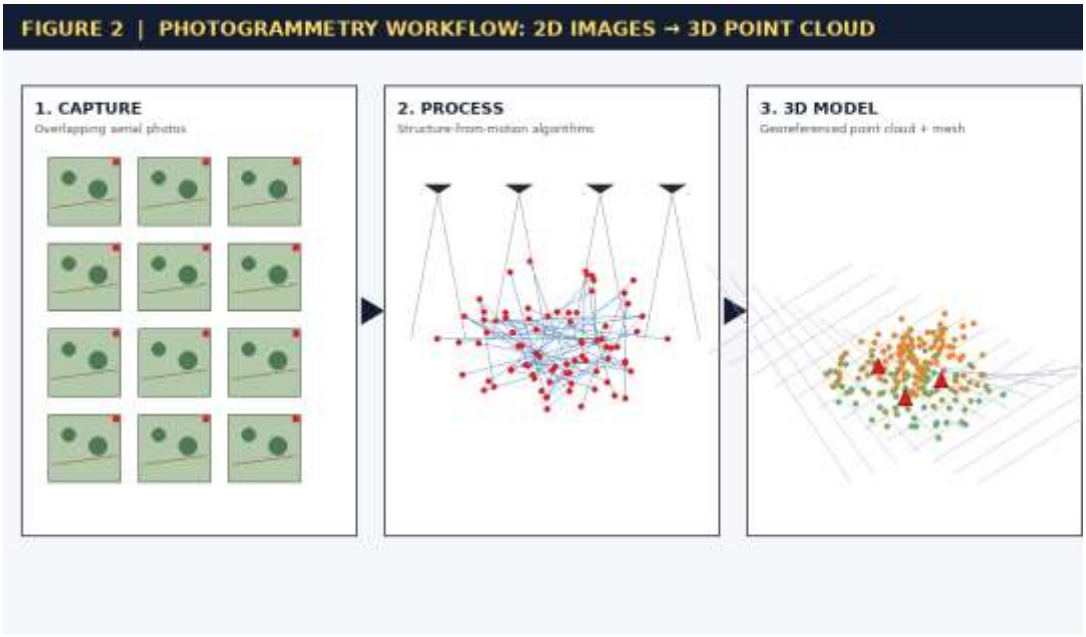

Figure 2 — The photogrammetry workflow. Overlapping aerial photographs (left) are processed by structure-from-motion algorithms (center) that triangulate camera positions and tie points to produce a georeferenced 3D point cloud (right). Evidence markers placed at the scene appear in the model with their real-world coordinates preserved.

The accuracy is real. With proper ground control points placed and surveyed before the flight, drone-based photogrammetric models routinely achieve survey-grade accuracy — single-digit centimeters in horizontal and vertical position. Without GCPs, the relative accuracy of measurements within the model is still sufficient for most investigative purposes. An investigator can return to a six-month-old model and confidently measure the distance between two fixed objects, the slope of a ditch where a vehicle left the roadway, the height of a fence at a specific point, or the position of an evidence marker relative to a permanent landmark.

In practice, this turns single-visit scene work into a permanent record. A collision scene in which the roadway must be reopened in twenty minutes can be flown in a single battery cycle and reconstructed completely back at the office. A property dispute in which one party tears down disputed structures the following week can still be litigated from the model. A workers' compensation claim in which the alleged accident location changes appearance with the seasons can be captured on the day of the inspection and revisited for the duration of the case.

Video, Stills, and the Difference Between Them

There is a real distinction between video documentation and photogrammetric stills, and a competent investigator-pilot uses both for different purposes. Video tells a narrative — the orbit around a structure, the slow descent into a clearing, the continuous pan that establishes spatial relationships for a viewer who was not present. Stills, by contrast, are the raw material for measurement. A grid mission flown for photogrammetry will produce four hundred to two thousand individual frames in a standard pattern; a video mission flown for narrative will produce a smaller number of curated clips intended for presentation.

Both have evidentiary value when properly logged. Both fail evidentiary value when they are not. Every flight at Alden Wheeler is documented with a flight log entry that captures the date and time, the aircraft serial number, the pilot in command, the location with coordinates, the weather conditions including wind and visibility, the airspace classification and any LAANC authorization received, the purpose of the flight, and the file identifiers of the resulting media. That log accompanies the case file. When the work is later questioned, the answer is in the log.

Privacy, Trespass, and the Limits That Matter

Anything a private investigator does with a camera, a drone amplifies. The same is true of mistakes. South Carolina's privacy statute, S.C. Code § 16-17-470, prohibits “eavesdropping” and unlawful surveillance in places where a person has a reasonable expectation of privacy. The FAA does not regulate privacy at all

— it regulates airspace, aircraft, and pilot conduct. State trespass and privacy law fills that gap, and a Part 107 certificate is no defense to a state-law tort or criminal charge.

In practice, that means the operating envelope for investigative drone work is narrower than the FAA's airspace rules alone might suggest. Flying over open land visible from a public roadway is generally permissible. Flying low over a fenced backyard to look over a privacy fence is generally not. Hovering with a camera pointed at a bedroom window is never acceptable, no matter what the airspace classification says. The investigator who confuses what is legally possible to fly with what is legally permissible to capture will eventually deliver a client a problem instead of a case.

"What is legally possible to fly is not the same as what is legally permissible to capture."

Local rules add a further layer. Several South Carolina municipalities have enacted ordinances restricting takeoff and landing within their corporate limits. Federal preemption arguments aside, the practical reality is that a working investigator complies with the local rule, uses an alternative launch site, and avoids the fight. A case is rarely worth a misdemeanor citation in the trial record.

A Day in the Field: How It Comes Together

To make this concrete, consider a composite case that mirrors work an agency like ours runs regularly. A client engages the firm to document a contested property boundary in a rural Upstate county. There is a dispute over a fence line, an alleged easement, and a structure one party claims encroaches on the other's parcel. Ground photography and a tax-map overlay would tell part of the story, but not all of it. The acreage is wooded and hilly, and standing-elevation photographs distort distance. A drone changes the calculus.

The mission begins at the office. The pilot pulls the parcel boundaries from the county GIS, builds a flight polygon that includes a generous buffer around the disputed line, checks airspace through B4UFLY and confirms no Class B, C, D, or E surface restrictions apply, verifies that no temporary flight restrictions are active, and notes the local sunrise and sunset for the planned flight day. Weather is checked the night before and again the morning of the flight; sustained winds above twenty knots ground the mission. The aircraft is registered, marked with its registration number, and broadcasting Remote ID.

On site, the pilot performs a visual inspection of the aircraft, calibrates the compass and IMU as needed, and confirms a strong GPS lock with sufficient satellites. Ground control points — visible aerial targets surveyed with a GPS receiver — are placed at the corners of the area of interest and along the disputed line. The mission is flown in two passes: a nadir grid at one hundred feet AGL for photogrammetric work, followed by an oblique orbit at one hundred fifty feet for narrative video. Total flight time is approximately twenty-five minutes across two batteries. The pilot logs the flight.

Back at the office, the imagery is processed into an orthomosaic and a 3D model. The disputed structure is measured against the surveyed boundary. The fence line is traced. The model is exported to formats the client's attorney can review independently, and a brief is drafted that describes the methodology, the equipment, the flight parameters, and the resulting measurements. The client receives a defensible record. The case proceeds with that record on the table.

The same methodology, with adjustments for purpose, supports a wide range of casework. A search-and-rescue callout substitutes a thermal payload and a faster, looser grid. An accident reconstruction substitutes a tighter grid with more ground control. A premises liability inspection substitutes a focused oblique sweep on the area of alleged hazard. The discipline is identical. The output — calibrated, logged, defensible, and tied to coordinates — is what makes the work product useful long after the flight has ended.

Looking Forward

The technology is not standing still. Sensor resolution continues to improve. Onboard obstacle avoidance is making complex environments — dense canopy, structures with overhangs, indoor scenes through open doors — more practical to capture safely. Cloud-based processing has collapsed what used to be overnight computational jobs into thirty-minute turnarounds. Beyond-visual-line-of-sight (BVLOS) operations, currently available only by waiver under Part 107, are likely to expand under emerging FAA rulemaking and will, in time, allow long-distance area searches that simply are not feasible today.

The legal landscape is also shifting. South Carolina's General Assembly has had drone-related legislation in front of it in successive sessions, including bills addressing public-safety operations and privacy. Practitioners in this space need to track those bills, not just the FAA. A change in state law can move the operating envelope as quickly as a change in federal regulation.

What does not change is the core proposition. A SLED-licensed investigator who is also a Part 107 pilot brings two complementary disciplines to a case: the legal and procedural rigor that makes evidence admissible, and the aviation discipline that makes the evidence accurate. The drone is the tool that turns one investigator into a small aerial surveying operation. The dual credentialing is what turns the imagery into evidence. For agencies like Alden Wheeler Detective Agency & GPS, that combination is no longer a specialty service — it is the standard of care.

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