



**The Journal of Robotics,
Artificial Intelligence & Law**

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Volume 1, No. 1 | January–February 2018

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THE JOURNAL OF ROBOTICS, ARTIFICIAL INTELLIGENCE & LAW (ISSN 2575-5633 (print) /ISSN 2575-5617 (online) at \$495.00 annually is published six times per year by Full Court Press, a Fastcase, Inc., imprint. Copyright 2018 Fastcase, Inc. No part of this journal may be reproduced in any form—by microfilm, xerography, or otherwise—or incorporated into any information retrieval system without the written permission of the copyright owner. For customer support, please contact Fastcase, Inc., 711 D St. NW, Suite 200, Washington, D.C. 20004, 202.999.4777 (phone) 202.521.3462 (fax) or email customer service at support@fastcase.com.

Publishing Staff

Publisher: Morgan Morrissette Wright

Journal Designer: Sharon D. Ray

Cover Art Design: Juan Bustamante

Cite this publication as:

The Journal of Robotics, Artificial Intelligence & Law (Fastcase)

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A Full Court Press, Fastcase, Inc., Publication

Editorial Office

711 D St. NW, Suite 200, Washington, D.C. 20004

<https://www.fastcase.com/>

POSTMASTER: Send address changes to THE JOURNAL OF ROBOTICS, ARTIFICIAL INTELLIGENCE & LAW, 711 D St. NW, Suite 200, Washington, D.C. 20004.

Articles and Submissions

Direct editorial inquires and send material for publication to:

Steven A. Meyerowitz, Editor-in-Chief, Meyerowitz Communications Inc.,
26910 Grand Central Parkway, #18R, Floral Park, NY 11005, smeyerowitz@
meyerowitzcommunications.com, 718.224.2258.

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Sales

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ISSN 2575-5633 (print)

ISSN 2575-5617 (online)

Use of Drones for Conservation Surveillance—Benefits and Regulatory Hurdles in the United States

Eric B. Rothenberg*

Surveillance is critical to conservation, and drones have become a useful tool in assuring environmental, safety, and health compliance, especially for large sites. The author of this article discusses specific applications of conservation drones, drone regulations, and the future of this technology in environmental-compliance assurance and conservation.

Drone, or unmanned aerial vehicle (“UAV”)/unmanned aircraft system (“UAS”), technology suits a myriad of conservation and environmental protection applications, offering quick, easy, and cost-effective aerial imagery as well as sensor and monitoring capabilities.¹ Surveillance is critical to conservation (conservation drones), and drones have become a useful tool in assuring environmental, safety, and health compliance, especially for large sites.²

KEY ATTRIBUTES

Key attributes of drone technology are low cost and flexibility. A drone can be launched on demand—weather permitting—without needing to source and book manned aircraft services or to commission and wait for satellite imagery. The result is instantaneous, real-time imagery, which can be enhanced by light-spectrum filtering to capture information on contaminant types and physical agents (such as heat, radiation, and noise level). Unlike traditional surveying techniques, a drone requires minimal staff and can overcome common site-access issues such as impenetrable vegetation, boulders, and crevasses. In the conservation and natural-resource assessment area, methods commonly used to monitor wildlife and habitats have constraints in time and cost that can be overcome with drones.

SPECIFIC APPLICATIONS

Specific applications of conservation drones include:

- forest health monitoring;
- forest inventory;
- wildlife surveys;
- anti-poaching activities (such as identification and deterrence through use of drone audible alarms);
- reforestation;
- compliance monitoring; and
- air-quality monitoring.³

Examples include The World Wildlife Fund's use of drones to monitor illicit trade in Africa and Brazil's use of drones by the São Paulo Environmental Police to monitor deforestation and illegal mining operations.⁴ The Indonesian tax office uses drones to survey palm-oil plantations and track owners who misrepresent the actual size of their plantations.⁵

Drones are being deployed as an essential tool in surveillance required to implement emerging carbon-trade agreements being driven by the recent Paris accord, where compliance can be demonstrated through the carbon value of standing forests. A related, extraordinary application of the technology is reforestation or creation of new forest lands: BioCarbon Engineering, a UK-based startup, is seeking to plant one billion trees a year in South Africa and the Amazonian jungles through the use of "planting drones." The drones conduct a 3D aerial survey of potential planting zones and, after analysis, are then equipped with pressurized canisters of germinated seed pods, which are scattered from a height of two meters. The biodegradable seed pods break upon impact, allowing the seed to take root. After planting, the drones monitor the seeds' growth. Where a farmer might plant 3,000 seeds per day, drones can drop up to 36,000 seed pods daily, often in areas that a farmer would not be able to easily access.⁶

REGULATION OF DRONES

Drone usage in the United States currently faces both privacy concerns and uncertainty as to a regulatory framework being implemented at both the federal and state levels. The Federal Aviation

Administration (“FAA”) is focused on safety.⁷ The FAA’s rulemaking authority neither mandates nor permits the FAA to issue or enforce regulations specifically aimed at protecting privacy interests. As a result, states have stepped in to enact legislation focused on protecting privacy, resulting in significant variance across jurisdictions.⁸ There are also constitutional concerns and property-rights issues surrounding the use of drones by government agencies and other entities in the area of environmental monitoring.⁹

The FAA published a final rule, “Operation and Certification of Small Unmanned Aircraft Systems,” which became effective on August 29, 2016.¹⁰ The rule, codified under 14 CFR Part 107, covers commercial uses for drones weighing less than 55 pounds. The rule specifies the time of day operators can fly drones, limits flight altitude to a maximum 400 feet above ground, requires use within the operator’s visual line of sight, and prevents flight over any individual who is not directly participating in the operation, not under a covered structure, or not inside a covered stationary vehicle. All of these requirements can be waived if it can be shown that the proposed operation can be conducted safely. A key to implementation of the rule is a Low Altitude Authorization and Notification Capability (LAANC) system for drone traffic control that the FAA hopes to have online by the end of 2017.¹¹

THE FUTURE OF DRONES AND THE ENVIRONMENT

By 2030, it is estimated that as many as 30,000 unmanned planes will hover over the United States.¹² As drone technology advances, prices will inevitably fall and drones will become more widely available across the entire spectrum of environmental monitoring and to the public generally. There is concern about the potential misuse of drones, and anti-drone technology is being developed.¹³ But if used properly, drones have proven to be a valuable tool for both environmental-compliance assurance and environmental conservation.

NOTES

* Eric B. Rothenberg, a partner at O’Melveny & Myers LLP and the leader of the firm’s Environmental Practice, represents business and financial institutions in a broad range of adversarial matters, including superfund proceedings, toxic

tort claims, and private cost recovery actions. He may be reached at erotherenberg@omm.com. Alison Holtzman, an O'Melveny 2017 summer associate, contributed to the content of this article.

1. Drones for Environmental Protection and Conservation, SENSEFLY, <https://www.sensefly.com/applications/environmental-protection.html>.

2. There are many other regulatory compliance and enforcement uses of drone technology, such as drug enforcement, immigration enforcement, and transportation safety, which are not being addressed here.

3. Kurt W. Smith, *Drone Technology: Benefits, Risks, and Legal Considerations*, 5 SEATTLE J. ENVTL. L. 291, 292 (2015).

4. *Id.* at 293.

5. Ridha Aditya Nugraha et al., *Urgency for Legal Framework on Drones: Lessons for Indonesia, India, and Thailand*, 6 INDON. L. REV. 137, 139 (2016).

6. James Daly, *Re-Planting a Forest One Drone at a Time*, WIRED (last accessed July 26, 2017), <https://www.wired.com/brandlab/2015/07/re-planting-forest-one-drone-time/>.

7. Press Release, FAA Administrator Michael Huerta, DOT and FAA Finalize Rules for Small Unmanned Aircraft Systems (June 21, 2016) (“We are taking a careful and deliberate approach that balances the need to deploy this new technology with the FAA’s mission to protect public safety”).

8. Amanda Essex, *Drones and Environmental Monitoring*, 47 ELR 10101, 10103 (2016) (stating 22 states have enacted laws addressing privacy and drones).

9. Lucas Satterlee, *Climate Drones: A New Tool for Oil and Gas Air Emission Monitoring*, 46 ELR 11069, 11069 (2016).

10. 81 Fed. Reg. 42063.

11. Lois Mermelstein, *Summer 2017 Updates on FAA Drone Regulations*, ABA Presentation (July 13, 2017).

12. Smith, *supra* note 3, at 300.

13. See Matt Davenport & Sarah Everts, *Rise of the Machines*, C&EN, Feb. 29, 2016, at 39; see also Smith, *supra* note 3, at 300.