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The Integration of Homeland Defense Systems

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A master's capstone project

of

American Public University System

by

Nahom Getnet

In Partial Fulfillment of the

Requirements for the Degree of

Master of Arts in Homeland Security

February 2026

Capstone Professor:

Dr. Duane Benton

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ABSTRACT

The Integration of Homeland Defense Systems

by

Nahom Getnet

Master of Arts in Homeland Security

Capstone Professor:

Dr. Duane Benton

This capstone project examines the reason unmanned aircraft systems (UAS) are becoming a big threat to homeland security and why an integrated counter, UAS (C-UAS) strategy based on the incorporation of non-kinetic and kinetic capabilities is possible. The fast proliferation of available UAS commercially has exceeded available defensive frameworks, and both civilian and military agencies are facing operational, legal, and coordination gaps. The project examines the way in which layered C-UAS systems may be developed and operationalized to overcome the changing threats without contradicting domestic law, interagency duties, and considerations of public safety. The research synthesizes existing policies and operational practices and implementation strategies through a systems-based framework to introduce an applicable model of the combination of detection, identification, mitigation, and response capabilities. The results reveal the significance of interoperability, effective governance, and resiliency-oriented planning in the context of providing effective defense against UAS threats. Finally, the capstone will add to the scholarly work on homeland defense by providing an operational framework that facilitates coordinated, legal, and adaptive counter-UAS activity.

Keywords: unmanned aircraft systems, counter-UAS, homeland security, kinetic and non-kinetic defense, and systems integration.

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Introduction

Unmanned aircraft systems (UAS) have quickly become a tool of mass consumption as a form of recreation, business, and governmental service. In the meantime, they have been a significant danger to homeland security due to their increased availability. The affordability, ease, and the high rate of technological advancement have enabled the UAS to be integrated in surveillance, smuggling, physical disruption of infrastructure, and even physical attacks. The evolutions have made homeland defense models more complex as they were initially not programmed to deal with small sized, agile, and unidentifiable threats that travel along the civilian airspace. This has exerted strain on the government agencies to come up with effective counter-UAS (C-UAS) solutions that will be operationally viable yet remain lawful. This project aims to answer the research question of: *How can military, federal, and state agencies in the homeland-defense sector combine kinetic and non-kinetic counter-unmanned aircraft systems (C-UAS) platforms to create resilience against future aerial and missile strikes?*

This is the underlying problem which this capstone studies is that the current C-UAS efforts are scattered when it comes to homeland security. The identification, reporting, and treatment of threats of a UAS are not exclusive to one federal, state, or local agency operating under different authorities and restrictions. Individual technologies and policies are as available as possible, but would be applied individually, limiting their use to multi-faceted or organized threats. This absence of unified structure increases the risk of slow reaction, mix up of authorities and negative impacts on the security and essential infrastructures of the inhabitants. This disintegration is a reason why there is a need to have a co-ordinated strategy which will help bridge the gap between technology policy and operational practice.

Counter-UAS capabilities typically belong to two categories, namely kinetic and non-kinetic measures. Kinetic options are actions that entail physical interference or damage of a

UAS, whereas non-kinetic actions entail electronic, cyber, or control-based actions to counter or divert a threat. Each of these approaches has its own advantages, limitations and legal considerations, particularly in a highly-crowded environment. A balance between effectiveness and proportionality, safety and domestic law are the factors that the homeland defense planners should thoroughly achieve. These capabilities would not be valuable unless they are intended to be utilized, as it can provide holes in coverage, or even create additional risks to the overall security objectives.

The operations are also subject to legal and regulatory restrictions that complicate the operations. When compared to the overseas military environment, homeland defense activities are subordinated to strict statutory points of reference both in airspace, communications, privacy and the use of force. These limitations limit the application of certain C-UAS technologies and under what conditions. The absence of coordination mechanisms, or its inadequate development, results in the fact that agencies are not willing to act even in the case of the presence of credible threats. To eliminate these shortcomings, technical solutions need to be identified, along with the established system of governance and decision making processes which will help the state to act legally and in a timely manner in case of great consequences where inherent hierarchy matter.

The usefulness of the project is that it contributes to closing the growing gap between the pace with which homeland defense systems are falling behind in responding to UAS proliferation. The disruptive emergence of UAS technology typically aligns with the acquisition cycle, training cycle, and organizational alignment, and ends up in the defense being reactive rather than proactive. Being more prone to attacks caused by UAS, critical infrastructure, governmental locations, and other public places become more prone to threats, and the issues of inadequate security have more grievances than merely damaging the territory: they also impact

community reputation, stable economy, and national security. The hybrid C-UAS structure offers an avenue of preparedness increment in terms of the capacity of layered recognition, coordinated choice making, and responsive alternatives to specific threat environments.

5 The capstone will aim at examining how kinetic and non-kinetic C-UAS capabilities could be integrated purposefully into a homeland security setting. Another perspective the project assumes, rather than examining a single technology or agency, is the systems perspective with regard to interagency coordination, governance systems and the implementation issues. The study highlights the importance of resilience and interoperability where integrated systems will be handy as threats, technologies and policies continue to evolve. This introduction gives a background to the following sections. The literature review will position the UAS threat within the framework of the existing scholarship and policy debate, but the project design will execute the methodological framework in the framework of which the difficulties of integration will be examined. These lessons are then applied in the project implementation phase to propose a uniform framework that can be applied to ensure homeland defense against UAS threats is improved. Taken together, these sections will aim at contributing to a coherent, practical understanding of the contribution that integrated C-UAS systems can make to increase security without violating the law and other limits of society. This capstone makes the point about the necessity of both present and future-threat planning by promoting an integrated line of thought.

References

- AbdelRahman, M. A. (2023). An overview of land degradation, desertification and sustainable land management using GIS and remote sensing applications. *Rendiconti Lincei. Scienze Fisiche e Naturali*, 34(3), 767–808.
- Dobija, K. (2023). Countering unmanned aerial systems (UAS) in military operations. *Safety & Defense*, 9(1), 74–82. <https://doi.org/10.37105/sd.195>
- Dziwisz, D. (2024). Rethinking future conflicts: The cyber grey zone from the Russian perspective. *Politeja*, 21(92), 281–309.
- Early, B. R., Fahrenkopf, N., Horowitz, M. C., & Walsh, J. I. (2022). Climbing the ladder: Explaining the vertical proliferation of cruise missiles. *Journal of Conflict Resolution*, 66(6). <https://doi.org/10.1177/00220027221079399>
- Grieco, G., Amendola, D., & Anderson, D. (2025). Detection, tracking, and identification of drones: An overview on counter-UAS techniques and open challenges. *Proceedings of the Integrated Communications, Navigation and Surveillance Conference*. <https://doi.org/10.1109/ICNS65417.2025.10976862>
- Guttieri, K. (2025). Fighting through disruption. *The Cyber Defense Review*, 10(1), 93–114.
- Homiak, T. (2024). United States military thinking on war in the age of postmodern conflict.
- Khudeynatov, E. K., & Hashimov, E. G. (2023). The integrated air defense model: Enhancing national security. *Proceedings of the International Scientific and Technical Conference on Problems of Informatization*.
- Konert, A., & Kasprzyk, P. (2021). UAS safety operation: Legal issues on reporting UAS incidents. *Journal of Intelligent & Robotic Systems*, 103(3). <https://doi.org/10.1007/s10846-021-01448-5>

- McInerney, S. A., Waldrep, E., & Benight, C. C. (2022). Resilience-enhancing programs in the U.S. military: An exploration of theory and applied practice. *Military Psychology*, 36(3), 1–12. <https://doi.org/10.1080/08995605.2022.2086418>
- Mohsan, S. A. H., Othman, N. Q. H., Li, Y., Alsharif, M. H., & Khan, M. A. (2023). Unmanned aerial vehicles (UAVs): Practical aspects, applications, open challenges, security issues, and future trends. *Intelligent Service Robotics*, 16(1), 109–137.
- Nichols, R. K. (2020). Non-kinetic military avionics, EW, CW, DE, and SCADA defenses. In *Counter unmanned aircraft systems technologies and operations*. New Prairie Press.
- Rauhala, A., Tuomela, A., & Leviäkangas, P. (2023). UAS governance and regulatory frameworks in the European Union. Elsevier eBooks.
- Sanders, G. (2023). Rising demands and proliferating supply: The future of the global UAS market. Naval Postgraduate School.
- Shi, Y., Zhai, G., Xu, L., Zhou, S., Lu, Y., Liu, H., & Huang, W. (2021). Assessment methods of urban system resilience from the perspective of complex adaptive system theory. *Cities*, 112, 103141. <https://doi.org/10.1016/j.cities.2021.103141>
- Singh, B. (2024). Unmanned aircraft systems (UAS): Surveillance, risk management, cybersecurity, and legal regulation landscape.
- Steingartner, W., Galinec, D., & Kozina, A. (2021). Threat defense: Cyber deception approach and education for resilience in hybrid threats. *Symmetry*, 13(4), 597. <https://doi.org/10.3390/sym13040597>
- van Eck, L., Tendron, E., Popering-Verkerk, J. V., & Schreuders, M. (2025). Unpacking openness: A qualitative document analysis of how societal actors frame the opening of executive agencies. *Information Polity*. <https://doi.org/10.1177/15701255251336996>

Vince, J., Fudge, M., Fullbrook, L., & Haward, M. (2024). Understanding policy integration through an integrative capacity framework. *Policy and Society*, 43(3), 381–395.

Wang, J., Liu, Y., & Song, H. (2021). Counter-unmanned aircraft systems (C-UAS): State of the art, challenges, and future trends. *IEEE Aerospace and Electronic Systems Magazine*, 36(3), 4–29.

Zhou, S., Li, Y., Jiang, C., Xiong, Z., Zhang, J., & Wang, L. (2023). Enhancing the resilience of the power system to accommodate the construction of the new power system: Key technologies and challenges. *Frontiers in Energy Research*, 11.