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1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
03/22/2019	Master's Thesis	Sept 2017 - Mar 2019

4. TITLE AND SUBTITLE
Verification of Autonomous Systems: Developmental Test and Evaluation of an Autonomous UAS Swarming Algorithm Combining Simulation, Formulation, and Live Flight

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
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5d. PROJECT NUMBER

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5f. WORK UNIT NUMBER

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13. SUPPLEMENTARY NOTES

14. ABSTRACT
This research was driven by the increase of autonomous systems in the current millennium and the challenging nature of testing and evaluating their performance. A review of the current literature revealed proposed methods for verifying autonomous systems, but few implementations. It exposed several gaps in the current verification and validation methods and suggested goals for filling them. Through the use of modeling, software in the loop (SITL), and flight test, this research verified an autonomous swarming algorithm for unmanned aerial systems (UAS) and validated an exemplar of a testing framework. Thirteen sets of three-vehicle swarm data produced over two days of flight testing provided a baseline...

15. SUBJECT TERMS
Autonomous, UAS, Verification, Validation, Framework, Testing Continuum, UgCS, Developmental Test, Simulation, SITL, Flight Test, Decentralized, Flocking, Communication, Ad-Hoc Mesh Network

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