

Service Academy Swarm Challenge

Michael Eller, Logan Everett, and Jacob Walters

United States Military Academy

Corresponding author's Email: michael.eller@usma.edu

Author Note: CDTs Eller, Everett, and Walters are all Systems Engineering majors at the United States Military Academy. While this paper is a discussion of the systems aspect of the project, it would not have performed as it has without the help of the other members of the USMA Swarm team, made up of members from the mechanical engineering, electrical engineering, and computer science departments. They would also like to thank the assistance of the capstone sponsors Mr. Brick, LTC Lanham, COL Morales, and LTC Root.

Abstract: The Service Academy Swarm Challenge, funded by Defense Advanced Research Projects Agency (DARPA), is an opportunity for the three main service academies to develop and test tactically relevant concepts for unmanned aerial system (UAS) swarms. Each academy will develop their own swarm tactics and rapidly deploy up to 25 aircraft in combat scenarios both virtually and in live flight operations to explore the feasibility of swarm operations overseas. In the multi-disciplinary project, the main tasks for the systems cadets have been to properly manage the project, mathematically optimize the swarm composition between quadcopters and flying wings, and develop tactics. Because modifying aircraft was forbidden the cadets were unable to use the systems design process to create UAS modifications. Instead, systems cadets have taken project manager roles and employed scheduling methods taught in management classes such as generating work breakdown structures to keep the group organized for live-fly practices.

Keywords: Swarm, UAS, tactics