Unmanned Mapping Reconnaissance Vehicle

Tri Service Academy Capstone Project Competition 2016-2017

Sponsored by Boeing Defense Space and Security Systems

The Boeing Company is excited to continue the Tri-Service Academy Competition into 2016. This competition is intended to mimic a typical solicitation approach wherein Boeing acts as a soliciting party with each of the Service Academies 'competing'. Boeing does not intend to award any follow-on contracts, work, or otherwise as a result of this competition and the participation by all Academies and Boeing is for educational and informational purposes only. The US Naval Academy (USNA), US Military Academy (USMA), and the US Air Force Academy (USAFA) each have respective teams participating in this competition. The term 'team' throughout this document refers to each individual service academy team.

With the proliferation of unmanned systems and technologies, small team-transportable reconnaissance capabilities have become more commonplace providing situational awareness at near real-time. However, the detail of information required to effectively gain tactical advantage eliminates many unmanned systems from operational relevance and most small unmanned systems are ineffective in providing key situational details (structure size, 3-dimensional features, etc.) without significant post processing. 3D-mapping, scaling, and target recognition sensors and software are experiencing a similar growth in Technology Readiness Level (TRL) and affordability. In the spirit of providing unparalleled real-time information, your team mission is to design an Unmanned Autonomous System (UAS) capable of rapid deployment, area mapping, information reconnaissance, and processing delivering a usable battle-space map updated in near real-time to the operator. The system should consist of a single or multiple unmanned autonomous vehicles capable of being operated in a representative environment. For the purposes of this activity, each Service Academy may choose between: A hot humid and rain soaked environment, a dry cold (below freezing) environment, or a desert environment. The system consisting of all required support hardware, software, and equipment, must be transportable by a 12 person ODA/SEAL team on foot.

Each Service Academy is challenged to design a system based on small autonomous vehicles to meet a defined reconnaissance and security mission requirement. The system concept should be defined assuming technologies available in 2030. The team will then design and build a technology demonstration that illustrates key technologies in at least one subsystem area.

The project will span the full design and build process – from customer stated key performance requirements (provided by Boeing) through system-level derived requirements, concept trade studies, and detailed design, build and test of a demonstration for one or more focus areas of the overall system design. The project mimics Department of Defense (DoD) science and technology (S&T) programs in which first the system concept is defined and then a technology demonstrator is defined, designed, built and tested. Boeing, DoD Reviewers, and the Service Academies intend to utilize this mock-procurement cycle to help participating students understand the challenges associated in DoD acquisitions.

Each team will develop a Concept Design for an Objective System to be fielded in 2030. This Concept Design will describe the integrated system and will reflect technology trends to project system capabilities in 2030. Each team will develop an integrated concept and will develop requirements analysis and design on the full system, including major subsystems. Each team will then determine their approach for building a prototype technology demonstration to prove the capability and feasibility of their concept. Each team will develop a roadmap which outlines the timing of technology development (Technology Maturation Plan) and correlate the demonstrate effort to the roadmap. The prototype is not required to be at the same scale as the objective system. At Integrated Design Review (IDR) #2 the teams will present a rationalized approach for a technology demonstration (including major development risks of the objective design), will present their prototype design at Critical Design Review (CDR) level, and will satisfy the reviewers that they are ready to begin to procure hardware and enter final design. It is expected that deeper analysis of the objective design will be presented and the linkage of the prototype to the objective design will be clearly stated. At Final Design Review (FDR), the teams will review the objective system design, rationale for technology demonstration, detailed design and analysis for prototype, and test and evaluation results. The teams will then demonstrate the prototype system.