A4H Abstract

Through the Autonomy for Hypersonics (A4H) Mission Campaign, Sandia National Laboratories is investing internal research funds to explore autonomous systems technologies to increase the warfighting utility of hypersonic weapon systems. A4H is a 6.5 year-long strategic initiative that will enable rapid mission planning for response to time-sensitive threats and develop technologies for highly adaptive vehicles that intelligently sense their environment, determine a course of action in real time, and then robustly navigate, guide, and control to intended targets.

Autonomous systems are typically characterized using the "*SENSE-THINK-ACT*" loop for enabling for autonomous operations. While today's hypersonic flight systems are already autonomous, their operational relevance is significantly limited by their current abilities to perceive and adapt to their environment. A4H is working to enhance the *SENSE-THINK-ACT* loop to facilitate onboard intelligence, perception, and reasoning in hypersonic systems. Research within the A4H portfolio has already begun to transition from proof-of-concept demonstrations to higher-level tech maturation. As the A4H team enters the second half of the Mission Campaign, we have successfully transitioned research projects to customer-funded test flights including an autonomous mission planning solution and robust, optimized vehicle control algorithms.

This presentation provides an overview of Sandia's vision for the future of autonomous hypersonics and how A4H is advancing key capabilities in support of this vision. The presentation will spotlight projects from the portfolio as well as highlight efforts for risk reduction and tech transition of next-generation algorithms, techniques, and tools to Sandia's hypersonic mission space.

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.