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The following were results were provided on **7/28/2015** at **8:19:24 AM**:

Abstract ID: **15348**

Title: Safe Testing of Autonomous Systems Performance

Subcommittee: Emerging Concepts and Innovative Technologies

Abstract Text:

The role of unmanned platforms is rapidly expanding across a wide range of defense and homeland security missions. Currently operational unmanned vehicles are "tele-operated", using a command and control link to a remotely located pilot. However, operational complexity, operational pace, and a need to function in communication denied environments necessitate a trend toward autonomous unmanned vehicles. Autonomous systems that make independent decisions in complex engagements, such as the Navy's Autonomous Aerial Cargo Unmanned System, are currently under development and will require development and operational testing within the next 3-5 years.

Testing of autonomous systems presents some unique and vexing challenges. For instance, the infinite number of variations of test conditions that can exist to stimulate autonomous behaviors and the complexity of the interactions that can occur among multiple autonomous systems combine to make comparative measurement of autonomous system performance extremely difficult. Also, the inherent unpredictability of decision making by autonomous systems may result in decisions that are considered unsafe by managers of live test ranges. Advanced test and evaluation techniques that focus on the unique challenges of autonomy represent a clear and increasing need within the DoD.

The Safe Testing of Autonomy in Complex, Interactive Environments (TACE) Program is a research initiative to develop an advanced test infrastructure that can measure the performance of autonomous systems operating in complex Live-Virtual-Constructive (LVC) environments while ensuring that the autonomous system does not violate range safety policy. This paper will provide an overview of the TACE hardware and software architecture and will highlight the LVC testing that has been performed at both the Aberdeen and Yuma Test Centers to validate TACE capabilities. A discussion of anticipated transition activities with DoD partner programs will also be provided.

Will this paper have one or more authors from outside the U.S.? No

Discussion Points:

1. Autonomous
2. Test
3. LVC
4. Simulation
5. TENA

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DAVID SCHEIDT is a principal staff scientist at The Johns Hopkins University Applied Physics Laboratory in Laurel, MD. His current work concentrates on the research and development of distributed intelligent control systems. Before coming to JHU/APL, he spent 14 years in industry performing and supervising the development of information and control systems include a meta-database containing approximately 1000 heterogeneous databases, statewide immunology tracking, locomotive control, railroad dispatching, and distributed multilevel secure information systems. While at JHU/APL, Mr. Scheidt has been instrumental in the research, development, and demonstration of autonomous systems with applications to military missions for aerial, ground, sea surface, and underwater platforms.

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ROBERT LUTZ is a principal staff scientist at The Johns Hopkins University Applied Physics Laboratory in Laurel, MD. His background includes 34 years of practical experience in the development, use, and management of models and simulations across all phases of the DoD systems acquisition process. He currently serves as the LVC and testing lead for the TACE project and as the Airspace Integration Modeling and Simulation (M&S) lead for the Navy's Triton Program. Mr. Lutz also serves as the Chair of the Simulation Interoperability Standards Organization (SISO) Board of Directors, serves on the Tutorial Board and Fellows Committee at the Interservice/Industry Training, Simulation and Education Conference (I/ITSEC), and is a guest lecturer on M&S-related topics in The Johns Hopkins University Whiting School of Engineering.

Status: APPROVED