

Autonomous Systems



Armstrong is contributing to NASA's Roadmap for Robotics, Tele-Robotics, and Autonomous Systems through research in a wide range of areas, such as artificial intelligence, advanced flight control laws, new testing methods, collision avoidance technologies, and much more.

Armstrong's pioneering research into lifesaving collision avoidance technologies has the potential to be applied beyond aviation and could be adapted for use in any vehicle that has to avoid a collision threat, including aerospace satellites, automobiles, marine vehicles, and more.



Automatic Dependent Surveillance-Broadcast (ADS-B) System

Innovators at Armstrong and Vigilant Aerospace Systems collaborated for the flight test demonstration of an integrated ADS-B-based collision avoidance technology on a small unmanned aerial system (UAS) equipped with a micro ADS-B transceiver. The ADS-B Detect-and-Avoid (DAA) system is capable of providing small UAS with air-to-air collision avoidance against manned or unmanned vehicles.

NASA licensed its technology in 2016 to Vigilant Aerospace, and the company has commercialized it as part of its FlightHorizon™ product suite. Vigilant Aerospace joined unmanned aircraft response teams in Houston after Hurricane Harvey and used this technology to provide damage assessment and data collection services to the Federal Emergency Management Agency (FEMA) as it assessed flood damage in the greater Gulf Coast region.

Work to date: Armstrong and Vigilant Aerospace successfully flight tested the ADS-B DAA system in December 2016 on the DJI Phantom 4 quadrotor small UAS to further develop the technology in three key areas: flight beyond visual line of sight, collision avoidance, and autonomous operations. The system was also deployed in NASA's Sonic Booms in Atmospheric Turbulence (SonicBAT) research in August 2017.

Looking ahead: The team is working to develop an ADS-B ground station for NASA's Conformal Lightweight Antenna Structures project, which is developing antennas that enable beyond-line-of-sight command and control for UAS. The team is also working to demonstrate a similar system on Boeing F/A-18 and F-15 platforms for supersonic flight operations.

Partner: Vigilant Aerospace Systems

FlightHorizon is a trademark of Vigilant Aerospace Systems, Inc.

Benefits

- ▶ **Improves safety:** Enhances detect-and-avoid capabilities to maintain self-separation for UAS
- ▶ **Highly accurate and fast:** Broadcasts position 120 miles in every direction, providing location data that are accurate to within 5.7 feet every 1 second

Applications

- ▶ Search and rescue
- ▶ Military missions and training
- ▶ Law enforcement
- ▶ Border surveillance
- ▶ Scientific research

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