MIT LINCOLN LABORATORY

The Bulletin

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ACAS X Provides Next-Generation Collision Avoidance

Division 4: Homeland Protection and Air Traffic Control

The Laboratory recently celebrated 50 years of research and innovation in the air traffic control domain. This video series highlights some of the past, present, and future technologies that define the air traffic control program's success.

As discussed in previous videos in this series, TCAS is the system that uses aircraft transponders to detect possible collisions and alert the pilot on board with a suggested maneuver to avoid the collision. Unfortunately, TCAS was alerting too frequently and some pilots started ignoring the seemingly false alerts. This became a safety concern because the pilots might think that an alert was false and ignore it when it actually was accurate, leading to more midair collisions.

ACAS X is a family of collision avoidance systems that use machine learning to optimize traffic alerts, resulting in dramatically reduced nuisance alerting and improved safety. The Laboratory has run billions of virtual test flight hours, which allow ACAS X to recognize and appropriately respond to a wide range of flight configurations and more accurately alert when a real

threat is present. This technology has been specialized for a variety of aircraft—ACAS Xu for large unmanned aircraft, sXu for small unmanned aircraft, Xr for helicopters and urban air mobility, and Xa for commercial planes.

"Celebrating 50 years of Laboratory development of air traffic control technology provides an opportunity to reflect on the hard work and dedication of many exceptional staff that led to significant impacts enhancing aviation safety and efficiency," said Dr. James Kuchar, Assistant Division Head, Division 4. "At the same time, it gives us an anchor point to look forward to new work, such as advanced safety technologies like ACAS X, that we are excited to pursue over the next 50 years."

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