



Federal Aviation Administration

Airport Technology Research & Development (ATR)



Proof-of-concept pavement inspection using an Unmanned Aircraft System at Hartsfield–Jackson Atlanta International Airport (ATL)

Emerging technology provides real time data from extraordinary viewpoint

The continuous evolution of Unmanned Aircraft Systems (UAS) has stimulated interest among airport operators for various airfield applications.

Today's UAS are autonomous enough to execute complex flight patterns with minimal input from remote pilots and boast safety features including automatic return functionality and collision-avoidance. High-res cameras and other advanced sensors provide real-time data at heights, distances, and angles never before possible.

Historically, airfield activities such as obstruction analysis, pavement inspection, wildlife hazard management, perimeter security, and emergency response have primarily been conducted on the ground. But, observations and measurements from above offer opportunities to increase the efficiency of routine assessments, as well as an unprecedented

viewpoint during emergencies. Gradual integration of UAS could supplement or eventually replace the need for many ground-based procedures.

In cooperation with the FAA Office of Airports, ATR is working to enable the reliable, safe, and effective integration of UAS into the airport environment. Chief among outcomes of this effort are concepts of operation (CONOPs) for numerous airport applications, and the resulting FAA guidance documentation for their integration at our nation's airports.

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ATR plans to continue refining its assessment of current best practices alongside airports and industry through various outreach efforts. Continuous engagement with airport operators, vendors, and other stakeholders will play a vital role as the FAA identifies suitable technology and standards for the five core UAS applications (see reverse).



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The FAA Office of Airports has identified five core applications for UAS in the airport environment, listed in order of priority: Obstruction Analysis, Airfield Pavement Inspections, Wildlife Hazard Management, Perimeter Security, and Aircraft Rescue and Firefighting.

Together with other industry leaders in UAS integration (airports, agencies, and organizations), ATR is developing concepts of operation (CONOPS) that identify suitable technology for each of these core applications and affect FAA-authorized guidance resources. Methods and means for all applications will continue to be gathered and refined through outreach efforts including expert focus groups.



Obstruction Analysis

In order to identify obstructions that penetrate airport surfaces, UAS are flown on a pre-set flight path and take geo-referenced photographs of the surface below them at set intervals with an onboard camera. These images are used to generate 3D “point cloud” models of area elevations. A user can determine the location and extent of any penetrations by comparing an obstruction surface to the generated models. Findings contribute to airport decisions including land-use planning and tree clearing projects.

UAS obstruction analysis models are produced faster and in far greater detail than ground-based assessments—and at a fraction of the cost. ATR is researching this application in collaboration with the South Carolina Aeronautics Commission (SCAC), an industry leader that is actively using UAS for obstacle clearance surveys.



Airfield Pavement Inspections

Each year, about 70% of Airport Improvement Program grants are allocated for work on airfield pavements. This application focuses on using UAS and advanced sensor technology for more efficient and economical pavement condition evaluation and management.

ATR is collaborating with Hartsfield-Jackson Atlanta International Airport (ATL) to test proof-of-concept pavement inspection and analysis with UAS in order to increase efficiency and thereby reduce runway closure times. High-resolution, geo-referenced imagery of airport pavement surfaces are captured and used to identify signs of aging and distress. Some sensors may eventually supplement Pavement Condition Index (PCI) measurements.



Wildlife Hazard Management: Mitigation and Detection/Monitoring

Wildlife strikes can pose a significant safety risk to aircraft. Part 139 airports are required to monitor, and if necessary, mitigate wildlife strike risks in and around airports. The objective of this application is to increase aviation safety by reducing the likelihood of damaging wildlife strikes in and around the airport environment.

In partnership with U.S. Department of Agriculture (USDA) – Wildlife Services, ATR is researching various types of UAS platforms and sensors as a tool for avian hazing, as well as for the detection and monitoring of wildlife activity on and within the vicinity of airports.



Perimeter Security

This UAS application has been implemented as a method for improving perimeter airfield fence inspections. UAS allow inspectors to efficiently examine areas that are difficult to reach by foot or in ground vehicles.

In order to enhance perimeter surveillance, ATR and the National Safe Skies Alliance collaborate in testing UAS and sensor technologies capable of detecting and locating individuals posing as intruders. Assessments have been performed at Savannah-Hilton Head International Airport (SAV) and McGhee Tyson Airport (TTS).



Aircraft Rescue and Firefighting (ARFF)

Until recently, airport firefighters have been able to observe events only from the cab of a rescue vehicle or on the ground. UAS may now be used to capture live video of emergency scenes from an elevated position. This would enable firefighters to make more informed decisions on attacking fires, evacuating passengers, and monitoring the position of other firefighting personnel and apparatus for the duration of the emergency.

ATR is collaborating with Dallas-Fort Worth International Airport (DFW) and its Fire Training Research Center to develop and mature CONOPS for ARFF using UAS and identify the most advantageous UAS platforms and sensors.

Visit the ATR Website at www.airporttech.tc.faa.gov