

Improving Situational Awareness, Operational Risk Management, and Safety by Fusing Data from Multiple Sensor Types

Click here to see problem statement in IdeaHub: <http://ideascale.com/t/UKsrZBUU3> (Note: you must be a registered user in myACRP/IdeaHub.)

TAGS: Emergency Management, Environment, General Aviation, Operations, Public Safety, Safety, Security

STAFF COMMENTS

No comments.

AVERAGE INDUSTRY RATING SUMMARY

	Committees¹	Airport Community²
Achievable	4.00	3.78
Applicable	4.00	3.30
Implementable	3.50	3.10
Understandable	4.00	3.80
OVERALL	3.88	3.45

Notes: 1. Includes TRB aviation committees and committees from ACI-NA and AAAE.

2. Includes airport employees serving on active ACRP project panels.

[USE THIS LINK TO SEE DETAILED INDUSTRY RATINGS.](#) Click on the arrow in the Problem Statements dropdown menu in the upper right and select the problem statement number.

[USE THIS LINK TO SEE DETAILED INDUSTRY COMMENTS.](#) Click on the arrow in the Problem Statements dropdown menu in the upper right and select the problem statement number.

ACRP OVERSIGHT COMMITTEE (AOC) DISPOSITION

The average AOC rating among its voting members was 2.7 on a scale of 1 to 5. There was no discussion. The problem statement was not selected for ACRP funding and will be returned to the idea collection phase of ACRP's IdeaHub.

Improving Situational Awareness, Operational Risk Management, and Safety by Fusing Data from Multiple Sensor Types

TAGS: Emergency Management, Environment, General Aviation, Operations, Public Safety, Safety, Security

OBJECTIVE

The objective of this research is to develop and test an enhanced, data-fused airport safety system at an active airport. Data from solid-state radars; multi-spectral, electro-optical sensors; automated, real-time video feeds; and ADS-B will be fused and the output will be integrated on a single, functional user display for the purposes of:

- Enhancing SA and ORM for personnel other than those manning the Flight Safety Office (FSO) to include: Airfield managers, air traffic control, fire department personnel, and other airport staff
- Providing real-time incident advisories and/or alerts to airport end-users
- Automating the dissemination of other advisories and alerts for dynamic, easily-overlooked hazards such as birds, wildlife, vehicles, and UAVs.

The program is designed to test and evaluate the effectiveness and potential for integrating other airport systems/technologies to enhance safety and alerting at all airports, but especially remote and unmanned airports. This system as presented will be better able to collect, collate, and disseminate vital situational awareness information to all airport end-users over the system currently in-place. The goal of this project is to develop the tools for enhanced LAA and RAA for a safer airport operation.

BACKGROUND

Local Airport Advisory (LAA) and Remote Airport Advisory (RAA) are information services for airports to advise pilots of weather information, particularly current wind and altimeter readings, favored or designated runway, NOTAM, traffic information, bird condition, and wildlife hazards. There is also an emerging and rapidly increasing need for the ability to detect and report the presence of unmanned aerial vehicles (UAV) on or near the flight paths of aircraft. LAA and RAA advisories and alerts are provided by flight service station (FSS) staff, given as voice communications on ground-to-air frequencies or through automatic terminal information service (ATIS) or aerodrome flight information service (AFIS) as continuous broadcasts of recorded, non-control information. It is not mandatory for airports to issue LAA or RAA, but the FAA encourages airports to utilize these advisories because situational awareness (SA), operational risk management (ORM), and safety is enhanced when all airports participate. This project aims to provide airports with the tools to issue better and more accurate LAA and RAA.

Pilots benefit from receiving timely alerts and advisories. Often the need for an advisory or alert comes as an abrupt change in conditions, particularly air traffic, bird condition, wildlife hazards, and UAV alerts. Such an abrupt change may catch FSS staff off guard or may be missed by human observation altogether. Because it takes time for FSS staff to observe, populate, and make LAA or RAA available, maintaining situational awareness of airport environmental elements and events with respect to time or space, the comprehension of their meaning, and the reporting of their status is a challenge in a manned tower, but it is especially difficult at remote airports when identifying a situational change is made only through sensors or data systems.

Over the past decade, air traffic service providers have recognized that new, advanced technologies may be appropriate and beneficial in the provision of air traffic management services. Traditionally, the only participants in an advisory system are the FSS staff who observe, capture, and disseminate data to pilots. By implementing and evaluating a data-fused system, we will be able to determine the potential benefit(s) of using such a system to also

support airfield managers, fire department personnel, and other airport staff who would be informed about the current airport operational environment and the alerts for activities where they could assist in mitigating hazards. Although advanced, air traffic management technologies already exist, they have yet to be fully tested, evaluated, or deployed in an active airport environment. Accomplishing these research steps may determine how SA, ORM, and safety is improved when timely, accurate, real-time airport advisories and/or alerts are disseminated to airport personnel in addition to pilots. There may also be opportunities for enhanced situational awareness for pilots by providing data to electronic flight bags (EFB).

By combining data from technologies such as solid state radars, multi spectral, electro-optical sensors, automated real time video analysis, along with ADS-B, voice synthesis, etc., we will be able to determine if there are opportunities to improve access to timely, flight-critical information not readily available today. This research will also determine if combining data from these platforms also provides opportunities for airports to realize cost reductions in the provision of aerodrome air traffic services and if air traffic management services can be expanded during periods of non-tower operations.

APPROACH TO RESEARCH

- A. Obtain the various sensor systems to support this effort and work with providers to establish data exchange protocols (3 months)
- B. Work with the airport to define functional requirements for specified air traffic management services and environments (3 months)
- C. Conduct field evaluation trials (12 months)
- D. Document findings and recommendations for further research or follow-up actions. (6 months in total with 3 months for ACRP's internal reviews)

Process Used to Develop Problem Statement:

- Review and analysis of related literature.
- Discussions with local and State aviation departments.
- Discussions with local airport managers, air traffic controllers, fire departments, etc.

COST AND JUSTIFICATION

Recommended funding of \$500,000 for one, test site at an active airport, which includes costs necessary to host various technology sensors and platforms and to develop procedural, display, and distribution approaches. The estimated duration for all research actions and reporting is 24-months,

RELATED RESEARCH

We have participated alongside industry, government, and DoD at program events to test the use of multi-sensor data for adjacent applications:

U.S. Air Force – Black Dart for counter-UAS

U.S. Air Force – Bird Aircraft Strike Hazard Program

U.S. Army – Maneuver Fires Integrated Experiment (MFI) for tactical counter-UAS

U.S. Air Force – Commander's Challenge Counter-UAS FAA

– Autonomous Air Traffic Control Program

IDEA CREATOR

Person who first shared the idea with the IdeaHub community.

Carol Fuqua

Resource Manager (Supervisor / mid-level Manager / Assistant Manager) DeTect

Inc

OWNER/SUBMITTER

Person who volunteered to be responsible for developing the idea into a problem statement.

Carol Fuqua

Resource Manager (Supervisor / mid-level Manager / Assistant Manager)

DeTect Inc