



# Briefings

A publication of the Airport Technical Assistance Program of the Center for Transportation Studies at the University of Minnesota

Spring 2014 Vol. 14, No. 2

## Unmanned aircraft poised to take flight in industry, agriculture

In late 2013, Amazon.com CEO Jeff Bezos reported that the company plans to someday use unmanned aircraft systems (UASs) to deliver packages. Amazon is one of many considering these systems, as the list of potential uses is rapidly expanding. Where is this technology headed, and what does it mean for the region, and for transportation? About 110 state and national experts gathered for a daylong forum April 30 at the University of Minnesota to discuss these issues.

Often referred to as drones or unmanned aerial vehicles (UAVs), modern UASs can be used for a broad range of activities that include aerial photography, surveying, communications, monitoring forest fires and environmental conditions, and protecting critical infrastructure.

According to a 2013 economic report by the Association for Unmanned Vehicle Systems International (AUVSI), the UAS global market, currently at \$11 billion, will grow over the next 10 years to \$140 billion. The economic impact of UAS airspace integration will total more than \$82.1 billion

between 2015 and 2025, and in Minnesota alone, projections show this integration leading to more than \$142 million and 730 jobs in the first three years.

One of the first industries likely to put UASs into widespread use will be precision agriculture, said Mike Davin with the Twin Cities chapter of AUVSI. Precision agriculture uses technology such as GPS and digital mapping software linked to farm machines to apply the right management practice at the right rate, right time, and right place to optimize crop yields.

Precision agriculture totals approximately 80 percent of the potential commercial market for UASs. Uses include drought management, detecting disease, watering, and spraying pesticides.

The industry is predicted to grow quickly primarily because agriculture faces many new challenges, said Professor David Mulla with the University of Minnesota's Department of Soil, Water and Climate and director of the Precision Agriculture Center.

"We need to feed more people and address environmental issues at the same time. Given that there's only so much farmable land on the Earth, farmers must figure out new ways to be...more and more efficient," he said.

Doing this requires information about different field and crop properties. "We need to collect data, and this is where remote sensing comes into play—whether it's from satellites, airplanes, ground vehicles, or unmanned aerial systems," he said, adding that UASs provide very high-resolution imagery at relatively low cost.

Acknowledging the wide range of experi-



Exhibitors talked with attendees at the unmanned aircraft systems forum.

ence represented by attendees of the forum, Mulla said what is needed are partnerships—between the University, engineers, and businesses, for example. "The engineers can help design the platforms that collect the data....The agronomists and scientists will help develop the systems for interpreting that information and turning it into recommendations, and...businesses will be the ones selling this to farmers and showing them the value," he said. "Ultimately, I think this will benefit the farmers and our food production, our environment, and the public."

Professor Ian MacRae with the University of Minnesota Crookston's Department of Entomology explained that his work over the past 14 years has involved studying the targeted application of insecticides—that is, precision agriculture for insect management. Remote sensing, using near infrared reflection, is one way to detect insect-induced stress on crops, MacRae explained.

"Having the ability to readily and rapidly deploy sensors that can provide some feedback on what stressors are occurring in a field...you don't have to wait for a satel-

**UAS** continued on page 2



Attendees joined the discussion in a session on UAS impacts and implications.

## An airport's story: Warroad International

Warroad International Memorial Airport, also known as Swede Carlson Field, is a busy place. Located just north of the town of Warroad, Minnesota, it serves Roseau County and the surrounding area as well as Marvin Windows and its fleet of four aircraft. Airport manager Bethany Sundvor has been with the airport for two years, previously working at Grand Forks International Airport and completing her degree at the University of North Dakota in airport management. She and assistant manager Matt Rachuy manage and maintain the 320-acre

site that houses both corporate and private aircraft. The airport is owned and operated by the City of Warroad.

The airport's two runways are 13/31, the main paved runway, which measures 5,400 x 100 feet; and turf crosswind runway 4/22, which is 2,987 x 150 feet. Runway 13/31 is served by a MALSR on both approaches.

Warroad International averages 4,000 operations each year. Marvin Windows regularly flies builders, designers, and suppliers to the area to tour its plant and learn about Marvin's products, averaging at least

two or three flights daily. These flights occur most frequently in the winter, when construction is in the planning stages and builders are more available.

Since the airport is located only four miles from the U.S./Canadian border, the airport houses U.S. Customs services. International flights are processed at the airport on an on-call basis. The Warroad airport is also home to a DNR fire base, with firefighting aircraft operating in the spring and fall of each year.

According to Sundvor, the airport is undertaking rehabilitation of its parallel taxiway this summer, as well as upgrading its fuel stations to include 24-hour credit card fueling. In the near future, the airport also plans to construct a perimeter fence, since wildlife such as deer, coyote, and bear are common in the area.



**UAS** continued from page 1

lite to pass or to schedule an airplane to fly over the field,” MacRae said. “This is a very exciting potential new tool.” And being able to target the application of insecticide has both economic and environmental benefits, as less insecticide is used, he added.

One of the challenges to broader use of UASs is the lack of rules and regulations. Last November the Federal Aviation Administration (FAA) released its first annual roadmap outlining efforts needed to safely integrate UASs into the nation’s airspace; it plans to issue regulations by 2015.

“The greatest challenge is integrating UAS into the National Airspace System (NAS),” explained General Alan Palmer with the University of North Dakota. “We want to do this safely, we want to do no harm, and we want to be sure not to violate somebody’s personal space.”

The FAA has also established a test site program to aid the integration effort. Sites were chosen in Alaska, Nevada, New York, North Dakota, Texas, and Virginia. The North Dakota test site is the first to be granted an FAA Certificate of Waiver

or Authorization (COA), effective for two years, to begin using a Draganflyer X4ES small UAS. The goal is to collaborate with FAA and industry partners to develop equipment, systems, rules, and procedures.

“We understand the economic impact and potential of this business,” the FAA’s Randy Willis explained. “We get it, and we are working toward policies and procedures that will enable operators to safely integrate UAS into our NAS. But it’s a complex process that requires many considerations, none the least of which are privacy concerns.”

In a December 2011 report, the American Civil Liberties Union (ACLU) expressed concerns over the potential invasion of privacy and about “mission creep” — things such as drones being used to fire tear gas at protesters.

“In the research we have done...we have found that people are looking for transparency and accountability,” said the ACLU’s Charles Samuelson. “As we look at UAS technology as a bright prospective profit source, we have to remember that this profitable business is based in part on informa-

tion we can acquire without compensating the owners of that information....At this stage of the UAS industry, it is a good time to think about this privacy issue and how to head off what will be a large discussion over the next 20 years.”

Another major issue is the existing aviation/navigation infrastructure. When it was built 50 years ago, it didn’t account for a future that would include UASs. “There is a lot of work going on to identify the infrastructure changes that would [possibly] take place in order to support the services for UAS,” Willis said.

The forum was sponsored by AirTAP; cosponsors were the Minnesota Department of Transportation, the Minnesota Department of Employment and Economic Development, and MnDRIVE (a partnership between the University and the state of Minnesota to advance Minnesota’s economy and enhance the University’s ability to produce breakthrough research). A proceedings will be available this summer on the AirTAP website.

## Workshop shares strategies for reducing aircraft–wildlife conflicts

Birds and aircraft should not flock together. Almost 11,000 bird and other wildlife strikes were reported for U.S. civil aircraft in 2012, according to the Bird Strike Committee USA.

Controlling wildlife near airports is one way to minimize the potential for these dangerous collisions. AirTAP offers an annual training workshop on wildlife control strategies, led by Metropolitan Airports Commission (MAC) staff. This year’s event was held May 14 at the MAC Driver Training Center at Minneapolis–St. Paul International Airport.

Instructors John Ostrom from the MAC and Al Schumacher from the USDA provided a comprehensive session on current regulations and recommended practices for wildlife control. After spending much of the day discussing concerns and solutions, participants moved outside for hands-on experience with equipment provided by the MAC and USDA.

The 14 attendees included representatives from airports in International Falls, Thief River Falls, St. Cloud, Park Rapids, Fairbault, Bemidji, and Hibbing, and staff from MnDOT, the FAA, and the MAC.

This event continues to be an important session for Part 139 airports, since wildlife training is required annually. Attendee Bill Towle,



airport manager for St. Cloud Regional Airport, said one of the most valuable parts of the day was the direct exchange of ideas about common problems all airports, regardless of size, face daily.

AirTAP was developed through the joint efforts of the Minnesota Department of Transportation (MnDOT), the Minnesota Council of Airports (MCOA), and the Center for Transportation Studies (CTS).

*Briefings* is published quarterly in print and online. Please direct comments to:  
*Amy Friebe*, *Briefings* Editor  
*Mindy Carlson*, AirTAP Manager  
*Jim Grothaus*, AirTAP Director

Center for Transportation Studies  
University of Minnesota  
200 Transportation & Safety Bldg.  
511 Washington Avenue S.E.  
Minneapolis, MN 55455  
Phone: 612-626-1077  
E-mail: groth020@umn.edu

Web: [www.airtap.umn.edu](http://www.airtap.umn.edu)  
Designer: *Cadie Adhikary*  
Contributing photographer: *Michael McCarthy*  
Contributing writers: *Nancy Stregge*,  
*Ann Johnson*

The University of Minnesota is an equal opportunity educator and employer. This publication is available in alternative formats upon request; call CTS at 612-626-1077.  
Printed on recycled paper with 20% postconsumer waste.

Airport Technical Assistance Program  
University of Minnesota  
200 Transportation and Safety Building  
511 Washington Avenue S.E.  
Minneapolis, MN 55455-0375

**AIR TAP Briefings**

CENTER FOR  
TRANSPORTATION STUDIES  
UNIVERSITY OF MINNESOTA

NONPROFIT ORG.  
U.S. POSTAGE  
**PAID**  
TWIN CITIES  
MN  
PERMIT NO. 90155