Flying the Crowded Skies
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NASA’s new Unmanned Aerial Systems (UAS) Traffic Management (UTM) initiative intends to develop and demonstrate approaches that would allow low-altitude manned and unmanned operations to coexist safely. The agency will then recommend solutions to the US Federal Aviation Administration (FAA) that could be integrated with the national and global Air Traffic Management (ATM) systems.

In July, NASA held a convention – UTM 2015 – at the Ames Research Center at Moffett Field, California with representatives from more than 100 companies and universities. Amazon, Google, Harris Corp., Verizon (the largest cellular carrier in the US) and ten other companies have signed agreements with NASA to support the UTM initiative. Over 1,000 attendees participated in the event, showing a level of enthusiasm and optimism for what promises to be a new and exciting new era in aviation.

Dr. Parimal “PK” Kolarodekar, NASA’s Safe Autonomous System Operations (SASO) Project Manager, noted that “maybe in 10 years, every home will have a drone, and every home will act as an airport.” Dr. David Vos, the head of Google’s Project WingUAS, stated that in the future, he believed that thousands of drones – others have suggested it may be tens of thousands – would be flying over cities just a few hundred feet off the ground. Last year, Amazon suggested that “One day, seeing Amazon Prime Air will be as normal as seeing mail trucks on the road today, resulting in enormous benefits for consumers,” noting that more than 85% of Amazon orders are 5 lb (2.3 kg) or less, and that the service could enable the company to deliver products to consumers in 30 minutes or less.

Amazon and Google are both advocating industry-led management of low-altitude unmanned airspace, but with different approaches. Amazon proposes that faster, better-equipped small UAS fly at altitudes of 200 to 400 ft (61 to 122 m), and slower, less sophisticated systems without sense-and-avoid capabilities fly below 200 ft. Google’s approach is to use cellular networks used for planning, monitoring and separation, Automatic Dependent Surveillance-Broadcast (ADS-B) for collision avoidance from manned aircraft, and automotive Vehicle-to-Vehicle (V2V) communications for short-range UAS-to-UAS avoidance.

Unfortunately, helicopters often conduct their entire operations at 400-500 ft and transverse through the entire current and proposed UAS airspace, while ADS-B Out is currently installed in only about 4% of helicopters in the US. Furthermore, there has been some debate about whether there is even enough capacity to equip all existing American rotocraft by the January 1, 2020 deadline. An FAA official noted earlier this year that to meet the dead-

line, six helicopters would have to be equipped and certified each and every day through the end of 2019.

NASA’s UTM initiative should help define the final solution for integration of the airspace. According to NASA, “the UTM system would enable safe and efficient low-altitude airspace operations by providing services such as airspace design, corridors, dynamic geofencing, severe weather and wind avoidance, congestion management, terrain avoidance, route planning and re-routing, separation management, sequencing and spacing, and contingency management. UTM is essential to enable the accelerated development and use of civilian UAS applications.”

This new UTM initiative is not a moment too soon. In fact, it’s probably 5 to 10 years late, because along with the excitement of new markets and new applications using unmanned aircraft, there is the negative aspect of serious public safety issues that are growing exponentially from increased UAS usage.

By the end of July, the FAA said it was receiving multiple reports every day from pilots experiencing close calls with UAS. Pilots landing at New York City area airports have reported drones flying within 100 ft (30 m) of them – at 1,700 ft (520 m) altitude.

At least five times this summer, unmanned aircraft flying near wildfires in California and other western states have grounded helicopters and airplanes sent to douse the flames, allowing the fires to grow. Groundings have lasted up to 90 minutes. One event in June cost the US Forest Service as much as $15,000 for firebombing services that had to be scrubbed due to drones in the air. Northeast of Los Angeles, a fire in July spread so quickly it jumped Inter-
state I-5, scorching 30 cars in the process; five UAS scurrying around the fire
grounded tanker operations for 25 minutes, according to the San Bernardino
County Fire Department. According to the incident report, “Hobby drones, or
(UAS) unmanned aircraft systems, pose a major safety threat to firefighting pilots
and firefighters. When a hobby drone is flown into a fire area, incident com-
manders have no choice but to suspend air operations and ground aircraft until
the drone is removed from the area.”

The FAA announced that there have been more than 650 sightings of drones
near manned aircraft in the US – some as high as 10,000 ft (3 km) – through the
first seven months of 2015, compared to 238 sightings during all of last year.

Near misses with police, medical and other helicopters are also increasing to a
frightening frequency, sometimes at alti-
tudes of 2,400 ft (730 m) or more; pilots have had to take evasive action, narrow-
ly avoiding the unmanned aircraft.

Current FAA guidelines separate
model aircraft operations and non-
governmental civil UAS operations. Hobby-
ists are able to fly aircraft up to 55 lb (25
kg) without a certification for recrea-
tional purposes only, but must fly below 400
ft (122 m), be kept within visual line of
sight at all times, remain well clear of
manned operations, and generally not
fly within 5 miles (8 km) of an airport.

However, helicopters routinely operate from heliports – which, despite also fall-
ing within the FAA definition of an “air-
port,” are often not recognized as such
by the public – and have the ability to
land virtually anywhere when necessary.

AHS International recently warned
NASA’s Associate Administrator for Aero-
nautics Dr. Jiawon Shin and the National
Academies’ Aeronautics Research and
Technology Roundtable (ARTR) that it’s
likely only a matter of time before a
UAS causes a fatal helicopter crash. With
the explosive growth in unmanned air-
craft usage – as well as the ever-in-
creasing number of drone sightings and
near misses – it seems to be likely that
unmanned-induced fatal accidents may
soon begin to occur.

A shared vision and common under-
standing for safe operations is
needed. The FAA is now consid-
erg new Small UAS regulations, with a
Notice of Proposed Rulemaking (NPRM)
released in February 2015 for non-rec-
reational drones up to 55 lb (25 kg),
100 mph (161 km/h) and 500 ft (150 m)
alitude. Although the final rule for Small
UAS will likely not take effect for another
year or more, the FAA has been approv-
ing companies to operate commercial
UAS through case-by-case “Section 333”
exemptions. The agency announced in
early August that it had already granted
more than 1,000 exemptions, approving
requests at about 50 per week. These
approvals allow companies to fly sys-
tems for non-hobbyist purposes any-
where in the country up to 200 ft (61
m) – except in restricted airspace, close
to airports, and other designated areas.

As unmanned aircraft usage contin-
ues to grow, the airspace below 500 ft
altitude will become increasingly crowd-
ed. The lives of helicopter crews and pas-
sengers are at risk from hobbyists and
drone operators who are not adhering
to the simple FAA guidelines that are in
place. Helicopter crews must maintain
a vigilant watch for these new threats.
Collison risk can be mitigated by flying
higher when able and flying more slowly
down in the realm of the UAS so as to
improve the ability for mutual see and
avoid and to reduce the potential for
catastrophic damage in the event of a
collision.

The FAA has partnered with the Asso-
ciation for Unmanned Vehicle Systems
International (AUVSI), the Academy of
Model Aeronautics (AMA) and the
Small UAV Coalition with a campaign
(www.KnowBeforeYouFly.org) to edu-
cate private, public and commercial UAS
operators but the words “helicopter” and
“heliport” don’t appear on the site.

With UAS usage today appearing to
be frightfully like the “Wild West,” a
dramatic change is needed in public
awareness and attitudes toward flying
unmanned aircraft near areas of oper-
ations for fixed-wing and rotary-wing
aircraft. Government agencies and UAS
organizations, manufacturers, retailer-
s and operators must recognize the
special vulnerability of helicopters to
unmanned aircraft and educate users of
their responsibilities.

AHS International is working to raise
awareness of the hazards of low altitude
operations and influence the regulation
and enforcement of that airspace for the
safety and benefit of all of its users.

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**Student Design Competition Winners**

The University of Maryland and
Georgia Institute of Technology/
Middle East Technical University
(METU) took top honors in the 32nd
Annual AHS International Student
Design Competition. The 2014-2015
competition, “Distributed Logistics in an
Urban Setting Using Small Unmanned
Aerial Vehicles,” challenged students
to design a small, distributed logistics
delivery UAS and its role in a large
logistics system concept. The Boeing
Company sponsored the competition
with $10,000 in prize money plus $2,000
in travel stipends. A total of 14 teams
from around the world submitted
entries in this year’s competition.

In the graduate category, University of
Maryland’s winning “AirEZ” was a novel
quadrotor-biplane-tailsitter UAS with
the ability to hover, transition quickly
into high speed forward flight, and
efficiently transition back to hover for
landing. Second place went to Georgia
Institute of Technology/METU for its
“GT STORK,” which also won the Best
Hardware Validation prize. Rensselaer
Polytechnic Institute captured third
place with its “ADD90.” Indian Institute
of Science Bangalore’s entry, “Lakshya
IIS,” captured the Best New Entrant.

The Georgia Tech/METU “Air Buzz”
quad tilt-rotor UAS was the first place
undergraduate design. The Pennsylvania
State University won second place, as
well as the best hardware validation
prize, for its “ROAR” design; third
place went to the Georgia Tech/METU
“HARETC” entry. New River Community
College, with their entry of “New
River Harrier,” was recognized as the
undergraduate winner of the Best New
Entrant award.

More information about the AHS
Student Design Competition can be
found at www.vtol.org/sdc. The
top-winning entries from the 32nd
Student Design Competition are
posted, along with previous winners.
The site also features the new Request
for Proposal for the 2015-2016 AHS
Student Design Competition; sponsored
by Bell Helicopter, the “Air Launched
Unmanned Disaster Relief Delivery
Vehicle,” is also a UAS.