Unmanned Systems Sentinel Summary

Please keep in mind that in most instances the below summaries are excerpts from the original article. The full articles can be viewed at the accompanying hyper-links. The inclusion of these links does not represent an endorsement of the organization, service, or product. All opinions expressed are those of the respective author or authors and do not represent the official policy or positions of the Naval Postgraduate School, the United States Navy, or any other government entity. Immediately below are this edition's highlights with bookmarks to the respective articles:

NAVY/USMC:

Combat Test of Lockheed Mine-Hunting Drone Postponed, Navy Says

RE2 wins robotic arm contract

Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUCV) Sea Trials Set for 2016

ARMY:

Unmanned Helicopter Passes Key Test

Robo Raven: A drone that actually does fly like a bird - Army Research Lab

2016 gear: New pistol, mini UAV, ear pro and more

USAF:

The Dirty Secret of So-Called "Unmanned" Systems

Air Force struggles to add drone pilots and address fatigue and stress

RPA flights could expand outside of Creech, says head of Air Combat Command

NATIONAL AIR SPACE:

Nano-radar system for UAVs collision avoidance set for 2016

One Map That Shows Why Regulators Are Freaking Out About Drones

The FAA is about to require recreational drone registration – MUST READ

Federally funded study will explore use of drones in Kentucky

Unmanned aircraft testing to be done in San Luis Valley

PUBLIC SAFETY:

A Drone with a Sense of Direction

'Drone Slayer' claims victory in court

Unmanned aircraft demonstrate success in crisis management

Aeryon Labs is the UAV Partner for Microsoft's In-Car Video Platform for Police Agencies

Self-flying drone dips, darts and dives through trees at 30 mph using Sense & Avoid – MIT

FAA Expands Unmanned Aircraft Pathfinder Efforts

"Invisible" water leaks detected by drone technology

Alphabet and Facebook develop rival secret drone plans

Mississippi governor leading trade delegation to Israel – UAS

Turbine-drone hybrid could catch more wind energy

Drone Strikes Could Cause Jet Engine Failure

Use of UAS for Agriculture in Africa

Autonomous Buses Are Finally (Almost) Here

SENSORS/APPLICATIONS:

Unmanned vehicle that can scan seabed

Potential preemptive countering of antiaircraft missile threats – UAS

This surveillance drone never needs to land

'World's fastest' 3-D printed drone takes flight

'BitDrones' Offer 3D Computer Displays Based on Programmable Matter

NASA's Innovative Drone Glider Prototype Aces Test Flight

Deep Learning for Commercial Autonomous Drones

COUNTER UAS:

Companies Tout Weaponry to Destroy, Disrupt Small Drones

INTERNATIONAL:

European Maritime Agency Demo for Portuguese UAV

COMMENTARY:

Welcome to the arms race for anti-drone weaponry

The future of ISR is unmanned, whether commanders like it or not

The drone pro

Federal Standards Keep Young Pilots from Manning Drones

NAVY/USMC:

Combat Test of Lockheed Mine-Hunting Drone Postponed, Navy Says

(Bloomberg) — The now-delayed combat testing of the underwater drone for Littoral Combat Ship was to start in November.

New analysis of results from run-up phase before commencing combat test to assess mine-hunting effectiveness uncovered “significant reliability issues” with subsystems, including communications with LCS, Navy officials say in memo

Delay allows independent Navy review team time to assess program’s future, memo says

Navy “is not yet announcing a revised schedule” for combat test, memo says

NOTE: Successful test needed to award next contract for as much as $400m for 18 more drones

NOTE: Lockheed Martin has more than $700m in future drone production work at stake if tests can't be successfully completed.

http://about.bgov.com/blog/combat-test-of-lockheed-mine-hunting-drone-postponed-navy-says/

Return to Top

RE2 wins robotic arm contract

Under the Phase I Small Business Innovation Research grant, awarded by the Office of Naval Research, RE2 will design inflatable underwater manipulator arms for the autonomous underwater vehicles.

"Ultimately, the manipulator arms will be used as a collaborative robotic system to assist explosive ordnance disposal divers in dismantling waterborne improvised explosive devices and other hazards," said an RE2 news release.

http://www.c4isrnet.com/story/military-tech/robotics/2015/11/04/re2-wins-robotic-arm-contract/75153622/

Return to Top

Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUCV) Sea Trials Set for 2016

The Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUCV), under development by the Defense Advanced Research Projects Agency (DARPA), also is being eyed for other tasks, Scott Littlefield, program manager of its DARPA's Tactical Technology Office, said Oct. 27 during the Association of Unmanned Vehicle Systems International conference.

"The Navy is considering using this [the ACTUV] for a variety of missions," Littlefield said, including mine countermeasures.

He said using the ACTUV would cost about $15,000 to $20,000 per day, compared with a destroyer that costs about $700,000 per day to operate. He said that other advantages of the ACTUV concept include greater payload and endurance than a ship-launched unmanned surface vehicle, the ability to launch from and recover at a pier, and the elimination of the need to integrate the system with a ship.

The 132-foot-long, 140-ton ACTUV is being built by Leidos at the Vigor Shipyard [formerly Oregon Iron Works] in Clackamas, Ore. The vessel is about 90 percent complete. The hardware of the systems is complete, with software being engineered presently.

Testing of the command-and-control and navigation systems has been conducted using a 40-foot workboat. A challenge of an unmanned vessel operating safely is compliance with International Regulations for Preventing Collisions at Sea.

"Generally, we're there," Littlefield said, saying that the system "generally meets expectations."

The main challenge, he said, is producing a vessel that "is about as reliable as a vessel operated by experienced mariners."

DARPA plans to conduct testing of the ACTUV and its systems for two years from Point Loma in San Diego, Littlefield said.

http://science.dodlive.mil/2015/11/09/actuv-sea-trials-set-for-early-2016/?source=GovDelivery

Return to Top

ARMY:

Unmanned Helicopter Passes Key Test

A self-flying Black Hawk helicopter delivered a small robotic amphibious all-terrain vehicle, or AATV, to a Florida drop zone on Tuesday, passing a critical test in autonomous helicopter flight and robot teaming.

The helicopter, flying autonomously — it also can be piloted remotely — "came in, picked up [the AATV], flew five to seven kilometers in an air route, delivered it to a ground location and released it. The unmanned ground vehicle moved through a ten-kilometer scenario where it faced different chemical, biological hazards and then fed that data back via satellite," said Paul Rogers, who directs Army's Tank Automotive Research Development and Engineering Center, or TARDEC.

The recent experiment marks the most important demonstration of the technology yet, including the collaboration with the robotic AATV, which was developed in part by researchers at Carnegie Mellon.

Sadowski noted that the Army has some 2,500 Black Hawks. "If you can retrofit them," he said, "now you can do autonomous logistics when the crew is resting. It gives you the ability to have an enhanced operational tempo. It can be retrofitted across the older UH-60s. In fact, they're trying to do that to show that it can be done."

http://www.defenseone.com/technology/2015/10/army-testing-robotic-black-hawk-helicopters/123260/

Return to Top

Robo Raven: A drone that actually does fly like a bird - Army Research Lab

Army researchers are working on developing a small unmanned aerial system that flies like a bird—a well-trained bird, in fact.

During tests earlier this month at the Spesutie Island Robotics Research Facility on Chesapeake Bay in Maryland, John W. Gerdes III, a mechanical engineer at the Army Research Laboratory's Vehicle Technology Directorate, held the half-pound "bird," called Robo Raven, in his hand, turned on a

transmitter, and sent it flapping into the sky. After executing some maneuvers and adjusting its flight for wind, the Robo Raven drew the attention of a raptor (maybe a hawk) Gerdes decided to bring it in, with the UAS alighting on his raised hand, just like a trained falcon would return to its master.

The research is part of ARL's efforts to explore the possibilities—and intricacies—of bird-like flight for UAS, the Army said in a release http://www.army.mil/article/158325/Robo_Raven_may_one_day_fly_for_Soldiers/. Among the potential advantages would be combining the hovering ability of, say, a rotocraft with the speed of a conventionally designed plane. A flapping UAS could also be quieter and less likely to draw visual attention.

But the project still has a long way to go. Engineering a machine to mimic the flight of birds, which is controlled by countless nerves, muscles and subtle, instantaneous adjustments to airflow, obstacles and other flying objects, is a complex problem. "It's extraordinarily difficult to unravel all of the pieces of that problem," even with flexible wings, sensors and a variety of controls, Gerdes said. "It's just too difficult to engineer at this point. But, we can approach that solution at least."

RoboRaven, which is being designed in conjunction with the University of Maryland, at the moment is a combinations of cutting edge technology and everyday tools. Its flexible, lightweight components are designed and created with the help of ARL's 3D printer. In the above video, Gerdes notes that they couldn't be made any other way. But the flapping motion is controlled by a commercial Arduino micro-controller (albeit specially programmed by Gerdes) and the transmitter is the same kind used for hobbyist drones and toy vehicles, the Army said.

But the main purpose right now if to study the dynamics of this kind of flight. "It's our goal to build the most amount of knowledge about flapping-wing air vehicles as possible," Gerdes said.

Next up, the research team plans to add a suite of sensors that can measure factors such as altitude, air speed, wing position, flapping speed, power draw, acceleration, and others. And eventually, they would like to develop a new flexible material that could make bird-like flight more possible.

https://defensesystems.com/articles/2015/11/09/arl-robo-raven-flapping-wing-uas.aspx?admgarea=DS&m=1

Return to Top

2016 gear: New pistol, mini UAV, ear pro and more

The biggest news out of Program Executive Office Soldier in the past year was the roll out of the improve Army Combat Uniform, featuring a more effective camo pattern — and less Velcro.

But that is just one in a portfolio of literally hundreds of pieces of personal equipment intended to enhance the warfighter in combat.

Brig. Gen. Brian Cummings, PEO Soldier's chief for just over a year, said he's always looking to add more tools to a soldier's toolkit.

Black Hornet

The PD-100 Black Hornet is a toy-sized UAV that makes short-distance reconnaissance easy. The four-inch, 18-gram personal scout can fly for about 25 minutes, maxing out at about 11 miles per hour while taking video and high-resolution images. A small, hand-held terminal receives the feed and controls the bird.

Cummings said it was one of the items that could come down the pipe next year that could have a big impact, though he didn't have a specific timetable.

This small, virtually silent mini-scout gives instant squad-level reconnaissance, whether over a hill, around a street corner or in different rooms in a building, all while keeping the soldier out of harm's way. The United Kingdom first used the device in Afghanistan in 2012, and the Norwegian manufacturer, Prox Dynamics, has supplied the U.K. and Norway with hundreds.

The Army Expeditionary Warrior Experiments tested out the Hornet in the spring to positive reviews from soldiers, and the results were discussed at the Maneuver Conference in September. Cummings said the Maneuver Center of Excellence was working on requirements documents to determine the Army's specific needs.

Enhanced Night Vision Goggle

The Army has begun rolling out the next version of the Enhanced Night Vision Goggle — but PEO Soldier plans to go a big step further as it works to enhance soldiers' situational awareness.

ENVG-III, like predecessors that stretch back to limited fielding in 2009, offers soldiers thermal imaging along with simple night vision.That means anything alive will light up yellow on the traditional, green night-vision background, only now with a widened 40-degree field of view for the thermal imaging. While ENVG-III will begin to roll out to soldiers this quarter, the real "leap-ahead capability" of Family of Weapon Sights-Individual will come a few years later, in 2019.

http://www.armytimes.com/story/defense/show-daily/ausa/2015/11/10/2016-gear-new-pistol-mini-uav-ear-pro-and-more/73510304/

Return to Top

USAF:

The Dirty Secret of So-Called "Unmanned" Systems

How to Cut Predator, Reaper UAV Crew in Half: Lt. Gen. Otto

PENTAGON CITY: The dirty secret of so-called “unmanned” systems is they require a whole lot of men — and women — to operate them. They’re just back at base, running things remotely, rather than hands-on in the aircraft. With the Air Force drone community overworked and undermanned, the service’s intelligence chief has suggested a Solomonic solution: cut the on-the-ground crews of the famous Predator and Reaper drones in half.

The Air Force could save perhaps 1,000 drone operator positions – and solve one of its toughest personnel problems – by redesigning the (notoriously awkward) ground control stations used to fly MQ-1 Predators and MQ-9 Reapers to make them “single-seater” aircraft. Predators and Reapers currently require two crew to function: a pilot and a sensor operator.

“There are certainly missions today that could be done by one woman or one man [who’s] both flying the aircraft and managing the sensors, if we architected the ground stations to enable it,” Otto said. “We could certainly design a cockpit that could be done by one for many missions with the option of being done by two for some missions.”

Such a redesign, Otto said, could have a “significant” impact on the Air Force’s current shortage of Remotely Piloted Aircraft (RPA) pilots. The Air Force has told Congress it could face a shortfall in fiscal 2016 of 400 of the 1,200 MQ-1 and MQ-9 pilots needed.

Predator and Reaper pilots have been departing the Air Force in growing numbers rather than continue to work 12 hours a day, six days a week, he said. Those conditions resulted from wartime demands for a rapid expansion of the number of daily Combat Air Patrols (CAPs) by Predators and Reapers to meet what Otto has called an “insatiable demand” for ISR even as the Air Force and its budget have shrunk.

Otto noted that the Defense Department has reduced the number of daily CAPs the Air Force must provide from 65 to 60. Under this “Get Well Plan,” as he called it, the Army will contribute 16 CAPs using its MQ-1C Grey Eagle, a Predator derivative, and contractors flying government RPAs will provide 10 more. All told, this will raise the daily CAPs provided to 86.

Noting suggestions the Air Force should start using enlisted personnel to fly drones, as the Army does, Otto said that while “there may be merit to that idea,” he doesn’t think it’s the solution. The problem isn’t a lack of officer pilots who can be assigned to RPAs but of instructors to train them, he said. The high pace of operations demands so many trained operators that few qualified people are left to train new personnel — which means the personnel shortage continues, a vicious circle. RPA training units are at 66 percent of full strength, he said, so the key is easing off the ISR pedal long enough for the Air Force to build up its drone instructor force.

http://breakingdefense.com/2015/10/how-to-cut-predator-reaper-uav-crew-in-half-lt-gen-otto/

Return to Top

Air Force struggles to add drone pilots and address fatigue and stress

Deep in the 60,000 acres of desert on this desolate air base, past a billboard that shows a Predator soaring in the sky, lies a high-security compound where America's drone pilots learn to hunt and kill from half a world away.

But "the Farm," as the little-known Air Force boot camp is known, faces a crisis.

Experienced pilots and crews complain of too much work, too much strain and too little chance for promotion operating the Predator and Reaper drones that provide surveillance and that fire missiles in Iraq, Syria and other war zones. Partly as a result, too few young officers want to join their ranks.

"All our pilots ever hear is that this work is difficult, underappreciated and fatiguing," said Col. Robert E. Kiebler, commander at Holloman. "We must change that image."

Desperate to find a solution, the Air Force is expected to unveil plans this week intended to ease the workload for drone pilots, boost their prospects for career advancement, and upgrade living and working conditions on drone bases across the United States.

"Looking into the eyes of the pilots out there, you can tell they're tired and worn out," said an Air Force official who interviewed many of the pilots but wasn't authorized to speak publicly. "There's a feeling of hopelessness that they can't continue doing this unless something changes."

Some pilots were forced to work six days a week, they said, operating drones an average of 900 hours a year. Fighter pilots, by contrast, fly an average of 250 hours a year. The drone pilots complained as well about inadequate housing and child-care services at drone bases.

The Air Force has offered a retention bonus of $15,000 a year for drone pilots to stay. It also lowered from 65 to 60 the number of drone missions, called combat air patrols, that are required each day. That freed up pilots to help become instructors at Holloman.

Commanders want to train 401 new drone pilots this year — about 40% more than last year — in a sun-blasted cluster of air-conditioned trailers deep inside the base. That includes 80 pilots previously assigned to fly bombers, cargo planes and fighter jets.

http://www.latimes.com/nation/la-na-drone-pilot-crisis-20151109-story.html

Return to Top

RPA flights could expand outside of Creech, says head of Air Combat Command

The Air Force could announce changes to remotely piloted aircraft missions as early as next week, including the possibility of greatly expanding operations outside of Creech Air Force Base in Nevada, according to Gen. Hawk Carlisle, head of Air Combat Command.

Carlisle said he expects Air Force Secretary Deborah Lee James will shortly announce changes that would help to take the strain off a beleaguered RPA force, including the possibility of drone operations at other air bases.

“We are looking at moving and opening up some other opportunities and basing options for RPA pilots,” Carlisle said Tuesday at a Defense Writers Group breakfast.

And the Air Force announced in February that leadership was considering allowing enlisted pilots to fly drones, a move which could relieve stress on current pilots and expand career opportunities for some airmen. Carlisle did not specify, however, whether that decision would be part of James' expected announcement.

Carlisle said that RPA operations are part of the “wave of the future,” and that the Pentagon needs to be better at recognizing the warfighting contributions made by airmen far away from the front lines.

The changes the Air Force will announce are designed to bring relief to RPA operators who have been working at a high ops tempo for years, Carlisle said.

“We still have to build a survivable, sustainable, long-term enterprise in the RPA,” the general said. “We couldn’t just stay on the ramp we were on because it was unsustainable.”

“It is a very, very capable system and it can be used in a variety of ways,” he said. “Unfortunately because of the surge, we haven’t really been able to expand on all the capabilities it has and use it to its full potential because they’re so heavily engaged in the current conflict.”

The Air Force has already turned to contractors to provide some RPA capabilities, including conducting intelligence, surveillance and reconnaissance flights. The Air Force decreased drone operations from 65 flights a day to 60 in an effort to lessen the strain on airmen, but looked to defense contractors to help make up for those flights.

The service has reported as least three crashes in the past eight months, including drones that went down in the Middle East and Africa. Those crashes haven’t slowed RPA flights, the general said.

“We have lost some,” Carlisle said. “But if you look at the accident rate and the number of hours and how much we’re flying them, [they are] pretty safe systems that have been operating and [have] pretty good safety records given the amount we use them.”

http://www.airforcetimes.com/story/military/2015/11/11/rpa-flights-could-expand-outside-creech-carlisle-says-remotely-piloted-aircraft-uav-drone/75527758/

Return to Top

NATIONAL AIR SPACE:

Nano-radar system for UAVs collision avoidance set for 2016

Incidents of collision between drones and planes continue to trouble pilots as well as development companies who work tirelessly to find the most efficient solution to avoid such incidents as much as possible.

One of those companies is IMSAR LLC, a research and development firm that specializes in radar devices and rapid image processing. The company believes it will have a suite of small collision-avoidance radar systems for small unmanned aircraft systems available by next year.

The collision avoidance radar systems will be available to a large range of UAVs, including package delivery quad-copters to military intelligence systems. The system will be based off IMSAR's NanoSAR and should range in cost in accordance with the UAVs, the company said.

"Radar is ideally suited for the sense-and-avoid problem because it can operate effectively at night and in low-visibility conditions, such as clouds, fog, smoke and precipitation," said Britton Quist, IMSAR's lead on collision-avoidance development. "This is a capability unmatched by optical, acoustic, infrared or LiDAR sensors."

Synthetic Aperture Radar is an imaging technology that transmits and receives signals in the microwave portion of the electromagnetic spectrum to collect data pertaining to targets and the area in which they are located, according to IMSAR.

There is no escaping, then, the need to act quickly and adjust the new technologies such as UAVs into our world and keep regulating the air territory in a way that prevents risk to human lives and valuables.

http://i-hls.com/2015/10/nanoradar-system-for-uavs-collision-avoidance-set-for-2016/?utm_source=Israel+Homeland+Security+%28iHLS%29&utm_campaign=2d661a597c-ENGLISH_DYNAMIC&utm_medium=email&utm_term=0_8ee2e16ed1-2d661a597c-89865369&mc_cid=2d661a597c&mc_eid=532334b8e8

Return to Top

One Map That Shows Why Regulators Are Freaking Out About Drones

In the wake of several high profile drone accidents and a spike in reported sightings over the past year tracked by the Federal Aviation Administration, the government is cracking down on the unmanned flying objects. By the end of the month new drone registration requirements are expected.

The FAA and the Department of Transportation want drone registration and have called on a handful of interested parties—ranging from drone manufacturers to Amazon and other companies with drone delivery systems in their sights—for recommendations. Thursday marks the final day of a three-day meeting of the new "drone task force," which has been issued a November 20 deadline to hand in its formal suggestions for policing drones.

News of the clampdown on the growing drone consumer market doesn't come as much of a surprise. According to the most recent report from the FAA, there were a total of more than 750 drone reported

drone sightings between November 13, 2014 and August 20, 2015. The growing popularity of drones has also been accompanied by increasing concern over their safety following a spike in close calls and accidents involving UAS.

Last week, nearly 700 people in West Hollywood lost power for several hours after a drone crashed into power lines in the Southern California neighborhood. The accident occurred mere weeks after the Los Angeles City Council passed an ordinance that would make it a misdemeanor to violate regulations similar to those imposed by the FAA, such as flying within five miles of an airport or more than 500 feet about the ground, reported the Los Angeles Times. The power outage came on the heels of a Kentucky district court clearing a man of criminal mischief and wanton endangerment charges after he shot down a drone flying above his property in July.

The FAA report includes pilot, air traffic and citizen reports of possible encounters with drones. The data includes where the drone was spotted and when in addition to a description of the UAS and the circumstances in which the sighting took place such as an estimate of altitude at which it was flying.

http://www.forbes.com/sites/abigailtracy/2015/11/05/map-regulators-faa-task-force-drone-regulations/

Return to Top

The FAA is about to require recreational drone registration

Here are the recommended rules.

A government task force created to recommend registration guidelines for recreational drones wrapped up three days of meetings in Washington Thursday. It plans to call for owners of drones weighing more than half a pound to register online, according to multiple members of the task force speaking on the condition of anonymity to discuss freely the private deliberations. This process would take place through apps or Web sites, including those of manufacturers, so retailers would not be burdened with having to complete a registration process at the point of sale.

The information collected would include the owner's name and address. In the event of a rogue drone, that would give the FAA a better opportunity to track down its owner. An e-mail address would be collected if the drone owner chose to share it to receive updates on drone rules. The group discussed requiring more detailed information such as Social Security numbers and date of birth, but decided against it.

Drones would be required to display a registration number that's easily accessible to a person handling the drone. These recommendations are being kept broad, and not making specific suggestions on a font size or style.

No fees would be charged for registration, so as to encourage as close to 100 percent participation as possible.

The FAA is not obligated to adopt the recommendations, but formed the group as its rushes to implement a system that would encourage the safe use of drones ahead of the holiday season, in which drones are expected to be a popular gift.

[The frantic sprint to figure out drone registration begins]

Pilots have reported increased sightings of drones, and they have at times interfered with wildfire fighting. Drones sales are also growing, with projections that 700,000 will be sold this year.

Such a registration system wouldn't be perfect, but it would provide an improvement over the present situation, which one task force member described as a wild west. They expect the registration of drones would discourage some bad behavior, and provide an opportunity to educate owners on how to fly safely.

The FAA set a deadline of Nov. 20 for the task force to finalize its recommendations. Some of those in the room described the atmosphere as collaborative and including trade-offs and compromises to arrive at a package deal. The most conversation focused on settling on an appropriate weight cutoff for registration.

The task force, which met at the FAA, consists of government officials, drone manufacturers, tech companies and aviation experts. It was chaired by Earl Lawrence, the director of the FAA's drone integration office and Dave Vos, who leads Google's drone efforts.

https://www.washingtonpost.com/news/innovations/wp/2015/11/06/the-faa-is-about-to-require-recreational-drone-registration-here-are-the-recommended-rules/

Return to Top

Federally funded study will explore use of drones in Kentucky

FRANKFORT — The Kentucky Commission on Military Affairs will be studying the growing use of drones in Kentucky, according to an agreement approved by the Government Contract Review Committee on Tuesday.

The $93,937 agreement paid through federal funds for Maryland-based consultant Anthony Pucciarella, a retired U.S. Navy commander and director of operations for the University of Maryland's Unmanned Aircraft System Test Site, was approved by a 6-1 vote, with Republican Sen. Paul Hornback voting against the contract.

Retired Col. David Thompson, executive director of the Commission on Military Affairs, said the study would help the state find its footing in an industry that's expected to reach $13.6 billion in economic impact and employ 70,000 within three years of federal-level integration of drones, according to figures from Association for Unmanned Vehicle Systems International.

“Up through 2025 that grew into over 100,00 jobs and $82 billion, so our role is to look at Kentucky and what part of that economic pie can we shape for ourselves and is it appropriate for the commonwealth,” Thompson said.

The contract follows the passage of House Joint Resolution 100 in this year’s legislative session, which calls on the commission, the Cabinet for Economic Development and the Transportation Cabinet to study the overall impact from Kentucky’s aerospace industry.

As the use of unmanned aircraft continues to expand, Thompson said the study will help lawmakers craft legislation on the appropriate use and regulation of drones.

“There seems to be a lot of questions from a range of legislators about where to go on this and what to do, so it seemed commonsense to me to bring in some experts and look at this industry, look at Kentucky specifically, how we might specifically benefit from the application of this technology in our commonwealth to either advance the safety of our people or improve the quality of life or improve the production of our farmers,” Thompson said, adding that the information would be available to lawmakers and educators “who are looking at ways they can adapt the workforce and graduates in engineering programs to this particular part of the economy.”

“Private industry does this much quicker and much more efficiently than we do in government,” said Hornback, R-Shelbyville, noting his belief that the military should study the use of drones. “… For government to do these type of things that the private industry is doing now, to me is not a wise use of dollars. I think we’ve got a lot better places to use dollars.”

http://mycn2.com/politics/federally-funded-study-will-explore-use-of-drones-in-kentucky

Return to Top

Unmanned aircraft testing to be done in San Luis Valley

SAN LUIS VALLEY - A collaborative effort involving six counties, the University of Colorado Boulder and the nonprofit aerospace advocacy group, UAS Colorado, has paved the way for the launch and testing of two unmanned aircraft systems (UAS) in the San Luis Valley.

The Federal Aviation Administration has awarded two Certificates of Authorization for the aircraft to fly in an 8,000-square-mile air space in the San Luis Valley to heights of 15,000 feet. San Luis Valley's Leach Airport in Center, Colo., will be the primary operations hub for UAS testing in the valley, with participation by number of other airports scattered across the valley, said Alamosa County Attorney Jason Kelly.

The FAA has approved two types of UAS for flight there: a 120-pound vertical takeoff craft known as the Reference Technologies Hummingbird and a smaller, battery-powered UAS that is being developed jointly by Black Swift Technologies and Swift Engineering and which can be hand-launched with a payload of up to 8 pounds. Reference Technologies Inc. is headquartered in Lafayette, Colorado, while

Black Swift Technologies, headquartered in Boulder, is a start-up company founded by CU-Boulder alumni Jack Elston, Maciej Stachura and Cory Dixon.

"The decision by the FAA to allow for the testing of UAS aircraft in the San Luis Valley is a big step forward in keeping Colorado at the forefront in the development and testing of these aircraft," said UAS Colorado CEO Constantin Diehl, who formally submitted the two COA applications requesting the San Luis Valley airspace.

In September, CU-Boulder announced university-wide "Grand Challenge" to build on strengths of the institution in aerospace-related science and technology. As part of the Grand Challenge, CU-Boulder is investing $2 million in a new initiative called the Integrated Remote and Insitu Sensing Initiative (IRISS) to use UAS, or drones, to enhance research data collection from the ground, in the atmosphere and in space.

Black Swift Technologies and CU-Boulder, for example, recently completed the successful flight of a Tempest UAS carrying instruments to measure soil moisture, a project supported by a NASA Small Business Innovation Research Program. The technology could have far-reaching applications ranging from drought assessment and flood forecasting to water conservation.

Operating one of the comprehensive UAS research programs in the nation, CU-Boulder has undertaken projects ranging from monitoring seal populations in the Arctic and charting sea ice changes near Greenland to intercepting storm cells associated with tornadoes in Colorado, Kansas and Nebraska and measuring gaping holes in Antarctic sea ice.

http://www.9news.com/story/news/local/2015/11/02/san-luis-valley-unmanned-aircraft-testing/75033562/

Return to Top

PUBLIC SAFETY:

A Drone with a Sense of Direction

Commercial drones are starting to be used for tasks like inspecting oil rigs and crops. But they still require a highly skilled human pilot, and even those that are semi-autonomous usually use pre-built maps or access the data over a wireless link.-

Researchers from the Swiss Federal Institute of Technology in Zurich are making drones more independent. They have demonstrated a small drone that can build its own 3-D map of an unfamiliar environment with minimal help from a human operator, and then plan its own routes around a space and its obstacles autonomously.

“This is the first time we can show full mapping, re-localization—finding the drone on the map—and planning on board,” says researcher Michael Burri, who worked on the project. The combination of software and sensors could make it easier to deploy drones for tasks like inspecting an oil rig, he says. A

company would need to do one manual flight to have a drone build its map. For subsequent inspections, the drone could do the job autonomously.

The drone uses its 3-D map to plan the most efficient route around a space.

The Zurich team used a small quadrotor that weighs one kilogram, the AscTec Firefly, and equipped it with a stereo camera and sensors that report velocity, orientation, and gravitational forces. They tested their software by flying inside a former industrial site, a challenging setting featuring large ducts and other industrial equipment.

The drone needs some human help to get started in a new space. While an operator helps it make an exploratory flight around the new environment, the drone's software builds a 3-D map by comparing data from its motion and orientation sensors with images from its camera.

The individual mapping and sensor techniques have been demonstrated before, but not all together on-board an autonomous drone, says Wolfram Burgard, a professor at the University of Freiburg, Germany. "This brings the technology closer to real-world application in inspection and surveillance tasks," he says. A paper on the new system was presented at the International Conference on Intelligent Robots and Systems last month. Burgard was editor-in-chief of the paper review board.

However, fitting all those mapping abilities into a small drone comes at a cost. With the computer and sensors on board, the drone used in the experiments could stay in the air for only seven minutes, as opposed to 15 minutes without the extra weight. Burri says that improvements to drone designs mean that this isn't a significant problem, and that newer drones on the market could manage a flight time of around 20 minutes with the same payload.

He and the other researchers are now working to give their drone the ability to avoid collisions with moving objects that don't appear on its map—for example humans or moving equipment.

http://www.technologyreview.com/news/542816/a-drone-with-a-sense-of-direction/

Return to Top

'Drone Slayer' claims victory in court

BULLITT COUNTY, KY (WAVE) – The man who calls himself the "Drone Slayer" called a judge's decision a victory.

Bullitt County Judge Rebecca Ward on Monday dismissed the case against William H. Merideth, who admitted to shooting down a drone he said was hovering over his home last July.

"I think it's credible testimony that his drone was hovering from anywhere, for two or three times over these people's property, that it was an invasion of their privacy and that they had the right to shoot this drone," Ward told the courtroom. "And I'm going to dismiss his charge."

The drone's owner, David Boggs, appeared stunned with the ruling.

"I'm dumbfounded," he said. "I really am. I don't think that the court looked at what really took place here."

Boggs contends his drone flew past Merideth's home at more than 200 feet above it, and didn't hover.

"People are maybe not quite sure of where the boundaries are while they're waiting for the law to catch up," Associate Professor of computer engineering and computer science Adrian Lauf said.

Lauf said bad press is pressuring drone manufacturers and the FAA to make the rules clear.

"If we practice more common sense, we probably wouldn't have as many shotguns shooting drones down, nor would we have people who feel threatened," he said.

"I was being watched. It was an invasion of privacy and I just, I wouldn't put up with it no more."

Boggs said he was with a group of people while flying the drone who would tell a different story if asked to testify. He has the opportunity to appeal his case in front of a grand jury. He said he's eager for the chance.

"This is a victory for him today, I guess," Boggs said. "But it's far from over."

http://www.wave3.com/story/30355558/drone-slayer-claims-victory-in-court

Return to Top

Unmanned aircraft demonstrate success in crisis management

Unmanned balloons and satellites can be effectively used to achieve integrated crisis management across large areas, EU researchers have confirmed.

A long-endurance drone was recently tested as part of a response to simulated threats and risks. The team reported that the overall performance and advanced imaging system of the craft – which can fly for over 20 hours non-stop – provided very high resolution images capable of identifying and precisely locating threats and risks. In addition, the drone demonstrated an ability to be deployed at very short notice.

The drone test was part of the four-year EU-funded AIRBEAM project, launched at the beginning of 2012. This project aims to develop a management system to cope with large-scale crises and to validate this system through operational demonstrations. Several intelligence platforms – unmanned aerial systems, balloons and satellites – have so far been tested to meet these objectives, with information processed in real time by a coordination unit.

This latest drone test flight was operated in civil airspace from the Beja air base in Portugal and used realistic homeland security scenarios as defined by the Portuguese National Guard and air force. The flight proved to unexpectedly practical and beneficial, since it detected a fire at a range of more than 20 kilometers. This information was transmitted in real time to help coordinate response teams.

The drone system complies with NATO's interoperability standards and can support a wide spectrum of military and homeland security missions. Its modular design allows it to carry a multi-sensor payload of up to 250kg in the fuselage or in pods. Other systems have been tested as part of the project's aim of achieving a multi-platform approach to security.

Indeed, another key aim of the project has been to assist the emerging market of civilian remotely piloted aircraft systems, and to convince regulatory stakeholders that this technology is ready for widespread use.

The AIRBEAM project includes 21 partners and three third parties from 11 countries. Small and large companies, research organisations, universities, stakeholders and end users have been an important part of the collaboration.

http://cordis.europa.eu/news/rcn/124201_en.html

Return to Top

Aeryon Labs is the UAV Partner for Microsoft's In-Car Video Platform for Police Agencies

Aeryon Labs, the leading provider of small Unmanned Aerial Systems (sUAS) for military, public safety and commercial operators worldwide, today announced a technology partnership with Microsoft® to include Aeryon SkyRanger within the new Microsoft® Advanced Patrol Platform (MAPP) vehicle.

MAPP will connect its drivers to an unprecedented amount of helpful and easy-to-navigate information. Currently, patrol officers spend vast amounts of valuable time bound to their cars, clicking between windows on bulky, often dated laptops. MAPP will consolidate the many elements officers must keep track of – providing dispatch information, driving directions, suspect history, a voice activated license plate reader, a missing persons list, location-based crime bulletins and statistics, a feed of shift reports and more.

For first responders, surveillance teams and investigators, high-quality aerial imagery provides the real-time intelligence needed to assess a situation immediately, ensure safety on the ground, and capture detailed evidence and forensics. By integrating aerial images from Aeryon sUAS with other cutting-edge hardware and software solutions, the MAPP program sets a new technological standard in policing and helps officers operate with better awareness, efficiency, mobility and safety.

"Law enforcement organizations throughout the world rely on Aeryon sUAS to collect aerial intelligence wherever and whenever they need it," commented Dave Kroetsch, President and CEO of Aeryon Labs Inc. "Including SkyRanger within the MAPP vehicle rounds out the comprehensive suite of technologies and highlights the value of aerial intelligence for ground-based personnel."

http://m.ourmidland.com/mobile/prweb/aeryon-labs-is-the-uav-partner-for-microsoft-s-in/article_a0a44847-7394-5c94-831e-f87b996730ef.html

Return to Top

Self-flying drone dips, darts and dives through trees at 30 mph using Sense & Avoid - MIT

A researcher from MIT's Computer Science and Artificial Intelligence Lab (CSAIL) has developed an obstacle-detection system that allows a drone to autonomously dip, dart and dive through a tree-filled field at upwards of 30 miles per hour.

"Everyone is building drones these days, but nobody knows how to get them to stop running into things," says CSAIL PhD student Andrew Barry, who developed the system as part of his thesis with MIT professor Russ Tedrake. "Sensors like lidar are too heavy to put on small aircraft, and creating maps of the environment in advance isn't practical. If we want drones that can fly quickly and navigate in the real world, we need better, faster algorithms."

Running 20 times faster than existing software, Barry's stereo-vision algorithm allows the drone to detect objects and build a full map of its surroundings in real-time. Operating at 120 frames per second,

The drone, which weighs just over a pound and has a 34-inch wingspan, was made from off-the-shelf components costing about $1,700, including a camera on each wing and two processors no fancier than the ones you'd find on a cellphone.

How it works – Traditional algorithms focused on this problem would use the images captured by each camera, and search through the depth-field at multiple distances - 1 meter, 2 meters, 3 meters, and so on - to determine if an object is in the drone's path.

Such approaches, however, are computationally intensive, meaning that the drone cannot fly any faster than 5 or 6 miles per hour without specialized processing hardware.

Barry's realization was that, at the fast speeds that his drone could travel, the world simply does not change much between frames. Because of that, he could get away with computing just a small subset of measurements - specifically, distances of 10 meters away.

While such a method might seem limiting, the software can quickly recover the missing depth information by integrating results from the drone's odometry and previous distances.

Barry says that he hopes to further improve the algorithms so that they can work at more than one depth, and in environments as dense as a thick forest.

"Our current approach results in occasional incorrect estimates known as 'drift,'" he says. "As hardware advances allow for more complex computation, we will be able to search at multiple depths and therefore check and correct our estimates. This lets us make our algorithms more aggressive, even in environments with larger numbers of obstacles."

http://www.csail.mit.edu/drone_flies_through_forest_at_30_mph

Return to Top

FAA Expands Unmanned Aircraft Pathfinder Efforts

The Federal Aviation Administration (FAA) has entered into a Pathfinder agreement with CACI International Inc. to evaluate how the company's technology can help detect Unmanned Aircraft Systems (UAS) in the vicinity of airports.

In testimony today before the House Aviation Subcommittee, FAA Deputy Administrator Mike Whitaker said that flying an unmanned aircraft near a busy airfield poses an unacceptable safety hazard. During the hearing titled, "Ensuring Aviation Safety in the Era of Unmanned Aircraft Systems," Whitaker told

The congressional panel the FAA signed an agreement this week to assess the safety and security capabilities of CACI's product within a five-mile radius of airports, and the agency also will collaborate with its government partners.

A steep increase in reports of small unmanned aircraft in close proximity to runways is presenting a new challenge for the FAA. It is the agency's responsibility to identify possible gaps in safety and address them before an incident occurs.

The CACI partnership is part of the larger UAS Pathfinder Program, which the FAA announced in May 2015. Pathfinder is a framework for the agency to work closely with industry to explore the next steps in unmanned aircraft operations beyond those proposed in February in the draft small UAS rule.

"Safety is always the FAA's top priority, and we are concerned about the increasing number of instances where pilots have reported seeing unmanned aircraft flying nearby," said Whitaker. "We are looking forward to working with CACI and our interagency partners to identify and evaluate new technologies that could enhance safety for all users of the nation's airspace."

"CACI is proud to partner in the FAA's Pathfinder cooperative research and development agreement to address the escalating Unmanned Aircraft Systems safety challenges that airports are facing nationwide," said John Mengucci, CACI's Chief Operating Officer and President of U.S. Operations. "The agreement provides a proven way to passively detect, identify, and track UAS – or aerial drones – and their ground-based operators, in order to protect airspace from inadvertent or unlawful misuse of drones near U.S. airports. This CACI-built solution will help ensure a safe, shared airspace while supporting responsible UAS users' right to operate their aircraft."

CACI's prototype UAS sensor detection system will be evaluated at airports selected by the FAA. The agency and its federal government partners will work with the company to evaluate the effectiveness of the technology, while also ensuring that it does not interfere with the safety and security of normal airport operations.

More information on the FAA's Pathfinder Program is at
http://www.faa.gov/uas/legislative_programs/pathfinders/

http://www.aviationpros.com/press_release/12133913/faa-expands-unmanned-aircraft-pathfinder-efforts

Return to Top

“Invisible” water leaks detected by drone technology

Cameras flown on drones could be used to detect leaking underground water pipes over hundreds of miles of desert, according to new research by Nottingham Trent University.

A study led by Professor Amin Al-Habaibeh, from the School of Architecture, Design and the Built Environment, shows how infrared technology could be used to detect large-scale leaks which are otherwise invisible to the naked eye.

The research, recently presented at the Institute of Electrical and Electronics Engineers (IEEE) conference in Jordan, aims to reduce the vast quantities of water which can be lost in large-scale pipes, particularly in arid countries where water is transported over large distances.

The research shows how high and low resolution infrared cameras can be used from height to detect the change in temperature of sand which occurs when leaking water underground evaporates from its surface.

By using GPS, the technology can pinpoint exactly where a leak has occurred to allow for remedial work to be done sooner. Short distances could be covered by an infrared camera attached to a quad-copter drone, whereas for greater distances, an infrared camera could be attached to an inflated zeppelin which is anchored to the back of a vehicle that is driven along pipeline routes.

The research was developed by Bubaker Shakmak, a postgraduate researcher at the School of Architecture, Design and the Built Environment. A simulation model of the Great Man-Made River in Libya was created for tests.

“This is a non-destructive technology which would provide a cost-effective way of monitoring major pipelines to help avert the large-scale loss of treated and consumable water.”

http://www.waterworld.com/articles/wwi/2015/11/invisible-water-leaks-detected-by-drone-technology.html

Return to Top

Alphabet and Facebook develop rival secret drone plans

The tech giants are racing to provide internet access from unmanned aircraft flying higher than passenger jets, having quietly registered new drone designs

Aquila, a drone with a 42-metre wingspan built by social media company Facebook, was unveiled in July.

Google and Facebook have significantly expanded their rival plans to develop unmanned aircraft that can provide broadband internet access from high above the Earth, the Guardian has learned.

Both Facebook and Alphabet, Google’s parent company, have quietly registered new drone designs with the US Federal Aviation Administration.

Much of the world's attention is focused on small drones, such as Alphabet's Project Wing or Amazon's Prime Air delivery drones, but Google and Facebook are also working on much larger drones that can operate far above passenger jets, and even as high as 90,000 feet.

Over the summer, Facebook revealed a huge solar-powered drone called Aquila with a wingspan of 42 metres capable of operating at up to 90,000ft, sharing internet access with radios and lasers. Aquila was developed by Facebook in the UK. The drone is made from carbon fibre that is about three times stronger than steel and lighter than aluminium. Yael Maguire, head of Facebook's Connectivity Lab, said in July that the Aquila would weigh around 400kg, allowing it remain aloft for 90 days at a time.

The Guardian has learned that the first and only Aquila prototype arrived in the US in late September, for flight testing later this year. However, registration papers with the FAA show that the aircraft now has a maximum takeoff weight of over 500kg. They also indicate that the Aquila was not delivered to Facebook or Internet.org but instead sold to a recently formed Facebook subsidiary called FCL Tech Inc, for $2m.

Google also recently registered two new drones with the FAA, codenamed M2 and B3. While there has been speculation that they might be part of Alphabet's own plans to offer internet access from on high, FAA documents seen by the Guardian show that the drones are tiny. The M2 weighs 2.25kg and the B3 just 900g, about twice as much as a soccer ball.

Alphabet is still pushing ahead with its internet drone plans though. Last spring, Google acquired Titan Aerospace, a New Mexico startup that had already tested and flown high-altitude solar-powered drones with wingspans of up to 50 metres. Following a crash of one experimental drone in May, Alphabet announced that it was relocating Titan Aerospace to Silicon Valley to join its growing Google Access team. Google Access also includes Project Loon, a plan to deliver wireless internet using unpowered balloons floating through the stratosphere.

However, the Guardian has learned from documents filed with the Federal Communication Commission (FCC) that Google is now planning a return to New Mexico, where it will conduct high-altitude tests at Spaceport America. The tests, which could last until March next year, will involve relaying data between ground stations using aircraft flying at up to 25,000ft, operating on the same 2.5GHz frequencies as 4G LTE cellphone signals.

Even if the companies solve the technical challenges of keeping drones aloft for long periods, sharing data via lasers and serving city-sized areas, both Alphabet and Facebook still face regulatory hurdles.

Alphabet has applied for an exemption, called "333" after a section of the FAA regulations, for its Project Wing delivery drones, but that is yet to be granted and in any case would only clear operation to a maximum height of 400ft. Google has also been testing its delivery drones in the US under a Certificate of Waiver or Authorization (COA) with Nasa, which permitted flights intended to help Nasa develop an automated air traffic control system for low-flying drones. This would not apply to drones flying far above other manned and unmanned aircraft.

“There’s not a lot to run into between 60,000 and 90,000 feet,” says Cummings. “But I’m sure regulators would be deeply suspicious if Google and Facebook were flying these over the US.”

Facebook and Alphabet would not comment.

http://www.theguardian.com/technology/2015/nov/06/alphabet-and-facebook-compete-with-secret-drone-plans

Return to Top

Mississippi governor leading trade delegation to Israel - UAS

JACKSON, Miss. (AP) — Mississippi Gov. Phil Bryant is traveling to Israel for a week with a delegation of state economic development employees and private business executives.

"We have Stark Aerospace in Columbus, which helps assemble UAV's," Bryant said. "And, they're very interested in the Center of Excellence at Mississippi State."

The Federal Aviation earlier this year chose Mississippi State University to run as a National Center of Excellence for Unmanned Aircraft Systems, to coordinate research and development.

The governor's spokesman, Knox Graham, said Bryant is also scheduled to meet during the week with Prime Minister Benjamin Netanyahu and former Israeli President Shimon Peres.

Joining Bryant on the trip to Israel are his wife, Deborah; Secretary of State Delbert Hosemann; and Mississippi Development Authority director Glenn McCullough and two employees of his agency's trade division.

Representatives of the Mississippi State Port Authority and the State Workforce Investment Board are also going, as are Mississippi Manufacturers Association president and CEO Jay Moon and executives from Airbus Helicopters, which has a plant in Columbus, and Huntington Ingalls Industries, which has a Pascagoula shipyard that is one of Mississippi's largest private employers.

http://m.greenwichtime.com/news/article/Mississippi-governor-leading-trade-delegation-to-6617147.php

Return to Top

Turbine-drone hybrid could catch more wind energy

A Dutch astrophysicist has designed a “flying” wind turbine which may avert environmental conflicts over large-scale wind farms if it proves to be commercially viable.

The “kite turbine” uses drone technology and will be able to capture wind energy at higher altitudes with far less impact than “conventional” structures, Dr Richard Ruiterkamp told this year’s “drone summit” in Westport, Co Mayo.

The flying turbine, which resembles a glider on a tether, moves in figures of eight. Its generator or "anchor" on the ground then converts the movement into electricity.

By capturing stronger winds at greater heights, it can generate eight times more energy than normal wind turbines, and won't fly in very bad weather, he pointed out.

Flying turbines could be used both on and offshore, and in areas which are not accessible to conventional wind turbines, he said.

"This shows that drones can be used for society's benefit," he said, noting that he had his own reservations about state licensing authorities allowing the market to have a complete free-run with drone technology.

http://www.irishtimes.com/business/technology/turbine-drone-hybrid-could-catch-more-wind-energy-1.2422067

Return to Top

Drone Strikes Could Cause Jet Engine Failure

Researchers at Virginia Tech's College of Engineering say drones as small as 8 pounds will have "devastating" effects if sucked into the turbofan engines of commercial aircrafts.

Computer-simulated tests showed an 8-pound drone would rip apart the fan blades of a a 9-foot diameter turbofan engine during take-off in less than 1/200th of a second. Furthermore, the tests discovered that drone debris thrashing about inside the engine could reach speeds 715 miles per hour and could lead to catastrophic engine failure.

"Because of the unprecedented damage a small or even micro unmanned aircraft systems can inflict on a passenger aircraft, pilots cannot risk flying in the same airspace where there are drones," says Bayandor. "While strict regulations are already in place to isolate drones from operations in controlled airspace, their enforcement have proven challenging, due to the anonymity of drone users."

"We never—in the design of these systems decades ago—thought about an actual rigid object as big as a drone flying next to the engine and being ingested by it," Bayandor said. "Today they can potentially pose a new type of threat altogether. It's opening a new avenue in foreign object studies and understanding."

According to the research, the speed of drone debris thrashing about inside the engine can reach speeds 715 miles per hour. Broken blades also create more fragments as the fan crumbles and warps the engine block housing, contributing to catastrophic engine failure.

The high velocity of the airliner times the mass of the drone generates the magnitude of the impulse. With the turbofan blades spinning at 2,200 RPM, the impact of the impulse creates shock and vibration throughout the system.

“We also showed that if that mass of the drone is substantial and you have a very heavy core with batteries and cameras then that, on its own, can cause more blades to break off and sheer off,” Bayandor said. “That causes even bigger deformation. The entire casing is now deforming into a shape that you can’t really recognize as a circular casing any more. What happens after that is that your entire engine gets stuck and you may not be able to get any thrust out of it.”

Bayandor and his team are exploring various methods that could be used to prevent more critical collisions of drones and aircraft, noting that engine failure rates and timing can change with different commercial aircraft and different relative impact velocities between the drone and the plane.

http://www.uasvision.com/2015/11/09/drone-strikes-could-cause-jet-engine-failure/?utm_source=Newsletter&utm_campaign=d177794f18-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_799756aeb7-d177794f18-297540877#sthash.8BztnxvW.dpuf

Return to Top

Use of UAS for Agriculture in Africa

Food security in Africa is an imminent threat. However, the agricultural expansion required to feed Africa's growing population is expected to have detrimental environmental impacts. Policymakers are looking for technologies to boost agricultural yields in Africa in more efficient and environmentally sustainable ways. Unmanned aerial systems (UAS), commonly known for military uses, offer promise. Using a mixed-method approach, this interdisciplinary dissertation examines the feasibility — technical and non-technical — of adopting agricultural UAS in Africa. Specifically, I investigated if and how UAS might mitigate the damage borne by the Tsetse Fly and the Red-Billed Quelea, both pests endemic to Africa that are associated with tremendous losses and have adverse impact on food security. Further, I identified drivers and barriers to agricultural UAS adoption and modeled these factors to infer variation in the likelihood that 36 African countries successfully adopt this technology. The results of my research indicate that while UAS offer a potential solution to some of Africa's most pressing agricultural problems, there are several non-technical factors that policy-makers should consider when evaluating initiatives to adopt this technology. Barriers include cost, absence of infrastructure, regulation and public resistance. Drivers on the other hand include support from stakeholders and UAS' potential to draw African youth to join the agriculture sector. Based on these findings, I recommend that policymakers perform mission-fit analysis to determine the suitability of UAS for the agricultural mission of interest and examine its costs and benefits. If UAS is found compatible and cost-effective, policymakers should lower the barriers and capitalize on the drivers that may influence the success of this technology's adoption.

http://www.rand.org/pubs/rgs_dissertations/RGSD359.html

Return to Top

Autonomous Buses Are Finally (Almost) Here

Autonomous cars and trucks, we are told, are just around the corner. Now, autonomous buses are, as well.

In a world-first, the Swiss city of Sion will prove a unique test-bed for a new type of transportation – the electric shuttle. BestMile, a startup founded by graduates of École Polytechnique Dédérale de Lausanne (EPFL), in association with researchers from their alma mater, have been hard at work to make the transportation of the future a reality today.

BestMile co-founder Anna Koymans says that "there is a lot of interest for driver-less mobility solutions, partly thanks to Google." BestMile have already participated in two European projects, but the new pilot-run will be the first time real life customers will use the platform.

BestMile is not out to compete with Google. While the latter develops general, all-purpose self-driving technology, Koymans and co. are working on what they term "the last mile issue" – bridging the gap between the last public transit stop and the final destination of the commuter. In semi-rural communities, where transport links are far from ideal, this problem makes public transit almost useless to some. Valerie Gerl, spokeswoman for PostBus – the operator with whom BestMile is teaming up for the experiment – said: "we want to see if this system will be appropriate to link places which aren't currently served by public transport."

The project should hit streets in the spring of 2016. During the initial test phase PostBus will run two driverless vehicles in Sion. The electric shuttle, build by French company Navya, with onboard logics developed by BestMile and EPFL researchers, will be able to provide an on-demand service for up to nine passengers.

http://i-hls.com/2015/11/autonomous-buses-are-finally-almost-here/?mc_cid=88b3cad742&mc_eid=532334b8e8

Return to Top

SENSORS/APPLICATIONS:

Unmanned vehicle that can scan seabed

The unmanned vehicle can travel underwater non-stop for at least 14 hours, covering up to 74 kilometers while scanning the seabed. It also produces clearer images thanks to the crystal used in the vehicle's sensor.

The unmanned vehicle is called the M400. It can travel underwater non-stop for at least 14 hours, covering up to 74 kilometers while scanning the seabed. Singapore's shallow waters and muddy seabed make it tough to spot underwater threats.

It also produces clearer images thanks to the crystal used in the vehicle's sensor. The piezoelectric crystal is developed and produced by Microfine Materials Technologies, an SME. One application of the crystal is what's known as dual-frequency imaging.

"Dual-imaging frequency have low and high frequencies," said Dr Lim Leong Chew, founder of Microfine. "Typical imaging uses high frequencies. Low frequencies have the capability of penetrating the seabed and to dig up what's actually buried. And by comparing the images of low and high frequencies you probably can tell whether you're just looking at rocks or metal-like objects."

"Right now it depends on the GPS to know their current locations. So in the event that you experience hostile interference, for example in the battlefield, then there's no way for you to know their locations and what you'd do now is to abort the mission and fly back to their launch location. With this product developed, it can be installed in the UAV and it'll be able to preserve the service of the GPS which will allow the UAV to continue their operations and missions."

http://www.channelnewsasia.com/news/singapore/unmanned-vehicle-that-can/2228118.html

Return to Top

Potential preemptive countering of antiaircraft missile threats - UAS

Weapon threats to airborne platforms (i.e., manned and unmanned aircraft and helicopters) include missiles and direct fire from cannons, rocket-propelled grenades, and small arms. In addition, future threats may involve directed energy weapons (e.g., laser weapons). Although radar is used in many of these threats to detect and track the aircraft, an increasing number of systems use electro-optical sensing for this purpose. These mostly passive systems, however, are much harder to detect and identify than the radar equivalents (for which warning and positioning capabilities are already well established). New threat detection systems are therefore required to detect the next-generation of antiaircraft missiles.

Directional IR countermeasures (DIRCM) systems on aircraft are designed to track, and direct energy toward, a threat. In particular, preemptive DIRCM systems should be able to detect, identify, and counter a threat before any missile (or other weapon) has even been fired. In the past, preemptive DIRCM system technologies have been studied as part of the Defense Advanced Research Projects

Agency's (DARPA's) Multi-functional Electro-Optics for Defense of US Aircraft (MEDUSA) program. In preemptive DIRCM systems, it is important to detect and analyze several different signatures, including ones that are not treated in conventional DIRCM systems. Such signals may include laser emission from the target, retro-reflections from optical sights and seekers, or the optical signatures of the weapon and operator (including the aiming and tracking activity).

We have been investigating the prospect of developing a reliable preemptive DIRCM system, both from a phenomenological perspective and from a technical point of view.1 We have not, however, examined size, weight, power, or cost issues. For this work, we have studied a variety of sensing techniques and optical components that will be required for the development of a preemptive DIRCM system.

First, we have assessed radar warning, with threat classification and positioning capabilities. This is a technique that can help the cuing of a DIRCM system (i.e., directing the system to an area of interest)

that has optical sensors for target classification (unless this is already achieved with a radar warner). This cuing can also direct the narrow-field-of-view sensor and the laser beam of the DIRCM system to lock onto the target. A high-resolution IR sensor (e.g., a forward-looking IR or IR search-and-track system) can also be used to detect the threat, either by itself or after radar indication. A high-resolution IR imaging system, with a pixel pitch down to 8μm, is currently being developed for this purpose.2

In an active imaging technique—which could potentially be part of a preemptive DIRCM system—we use the relatively high target-to-background contrast that is observed in the near-IR and short-wave IR regions.4 At these wavelength ranges, clothes often appear bright. It is therefore common for weapons to be revealed when they are observed against a background of clothes. Another important property of our active imaging approach is its range gating. We use this gating for target–background separation, and also for 3D imaging so that we can achieve efficient template matching during the recognition process. Furthermore, we can use this 3D imaging technique to make observations through vegetation and camouflage.5, 6

Laser range finders are often used within antiaircraft systems for target acquisition. In addition, laser beam riding may be used for missile guidance in these systems. A laser warning system is then able to provide threat classification and direction finding. Our investigations show that the most demanding task in this process is obtaining an efficient target detection at ranges that exceed the weapon range. For optics detection and recognition in the IR region, however, larger focal plane arrays—with high sensitivity and high time resolution—need to be developed. Although recognition of mechanically scanned sensors is relatively straightforward, this is not so for staring sensors (which require multispectral or very high range resolution profiling to be recognized). Target identification or classification conducted with passive or active imaging requires high resolutions (thus large optics and a small pitch). In future preemptive DIRCM systems, this function could be carried out with a target imaging pod that has the necessary capabilities.

In addition, achieving efficient laser counteraction—through laser dazzling or damage—requires lasers that operate in the 10W (or several 100mJ/pulse) region, with narrow beams (a few tenths of a mrad). Several laser wavelengths must be covered to efficiently deny optical tracking from different threats. We

have also found that effects related to the airborne platform (e.g., plume and aero optics) can limit the performance of the DIRCM systems. This is especially true for the functions that occur between detection and laser counteraction, in certain angular intervals. We find, however, that atmospheric turbulence is not severe for slant paths when the platform is above 50–100m.

We have investigated the potential of developing a robust preemptive DIRCM system. So far, our work indicates that realization of such a system will be a demanding endeavor (from several points of view). For instance, multi-wavelength lasers are required to obtain full spectral coverage. In addition, optics search and detection capabilities require sensitive focal plane arrays. We also find it difficult to envisage a way to combine all the necessary system functions into a single unit. It may be possible, however, to share functionalities between the DIRCM unit and a targeting pod. In our team at FOI, we are continuing

to work within the area of laser countermeasures, with particular focus on optics detection, sensor jamming, and sensor protection.

http://spie.org/x115778.xml

Return to Top

This surveillance drone never needs to land

The drone makers at CyPhy Works have a new aerial model that they're particular enthusiastic about. Why? Because it never needs to land to replenish its batteries.

The Parc hexrotor drone can stay aloft as long as its services are needed, monitoring its surroundings 24-7 with a gyro-stabilized high-definition camera until its humans owners decide it's time for a break. Where does the power that keeps the Parc in the air come from? Not from solar cells like some other drones. Parc gets its juice from a micro-filament that also carries data back to the ground. The fact that communications between ground control and a Parc "can't be intercepted, jammed, or spoofed" is a major plus in terms of security. There's a trade-off, obviously. While the micro-filament allows a Parc drone to continuously provide surveillance services, it's only able to operate in a limited area. They've got plenty of vertical range, though: up to 500 feet, which still allows a single tethered drone to cover a very large area.

Parc drones can carry extra communications equipment, too, and CyPhy's notes also say that the camera can be removed in the event that an "additional payload" is needed. That could open the door for things like spotlights or even countermeasures like pepper spray and tasers.

So, what happens if the micro-filament gets cut somehow? The Parc drone doesn't just come crashing back to the ground. It's got an emergency back-up battery on board that allows it to return safely to the ground in case its tether becomes severed.

http://mobile.geek.com/latest/258456-this-surveillance-drone-never-needs-to-land?origref=https:%2F%2Fwww.google.com%2F

Return to Top

'World's fastest' 3-D printed drone takes flight

What is believed to be world's first jet-powered 3-D printed drone, capable of reaching speeds in excess of 150 miles per hour, was on display for the first time at the Dubai Airshow on Monday.

The unmanned aerial vehicle (UAV) is the most complex drone of its kind, according to the group, with over 80 percent of its design made with printed materials including metal, nylon and a UV-resistant thermoplastic.

The drone weighs in at 15 kilograms and has a wingspan of 3 meters, according to Stratasys, which developed the drone with Aurora Flight Sciences. The 3-D printing firm aims to prove to the airline industry how this type of manufacturing can trump traditional methods.

"Overall, the technology saw us cut the design and build time of the aircraft by 50 percent," he said.

The worldwide market for 3-D printers and associated materials and services is set to reach $5.2 billion by 2015, climbing from $3.3 billion last year, according to data released by analysis firm Canalys earlier this year. This is a 56 percent increase I 12 months. By 2019, the market is expected to boom to $20.2 billion, the group said.

"Whether by air, water, or on land, lightweight vehicles use less fuel. This enables companies to lower operational costs, as well as reduce environmental impact," Sevcik said.

http://www.cnbc.com/2015/11/09/worlds-fastest-3-d-printed-drone-takes-flight.html

Return to Top

'BitDrones' Offer 3D Computer Displays Based on Programmable Matter

How's this for a bad-ass future? "Interactive self-levitating programmable matter." This is how researchers at Queens University's Human Media Lab are describing their new virtual reality scheme, dubbed BitDrones, set to be unveiled Monday at the ACM Symposium on User Interface Software and Technology in Charlotte, North Carolina.

The floating interface is enabled by swarms of nano quad-copters (the drones of BitDrones), of which there are three varieties. "PixelDrones" come equipped with a single LED and a small dot-matrix display; "ShapeDrones," which are intended to form the building blocks of 3D models, come covered in a fine mesh and a 3D printed geometric frame; and, finally, "DisplayDrones" are fitted with a curved flexible high-resolution touchscreen, a forward-facing video camera, and an Android smartphone board.

Enter the nano quadcopter drones. "In BitDrones, each drone represents a Catom that can hover anywhere inside a volume of 4m x 4m x 3m in size," the Queens group writes. "Drones are safe for users, who can walk around the interaction volume and interact with each drone by touch. A drone can be used for input, for output, or for both at the same time."

The system as it currently exists is pretty limited, consisting of only three drones. They're controlled using MultiWii software running on an iMac, while the system tracks markers on the user’s hands, allowing for gesture-based inputs. A persistent problem revealed by the prototype is the interference of turbulence in the environment, which limits how the drones are able to interact with each other.

Still, the BitDrones system offers a first step toward Sutherland's "ultimate display" dream. In his 1965 paper, he summarized a goal that persists over a half-century later: "If the task of the display is to serve as a looking-glass into the mathematical wonderland constructed in computer memory, it should serve as many senses as possible."

http://motherboard.vice.com/en_ca/read/pixeldrones-offer-3d-computer-displays-based-on-programmable-matter

Return to Top

NASA's Innovative Drone Glider Prototype Aces Test Flight

A remotely piloted aircraft achieved an important research milestone last month when a sub-scale "flying wing" glider successfully completed a series of flight tests.

The remotely piloted glider prototype is the third iteration of the Preliminary Research Aerodynamic Design to Lower Drag (Prandtl-D No. 3) aircraft. Previously, development on this concept led to some preliminary work on a NASA glider for Mars called Preliminary Research Aerodynamic Design to Land on Mars (Prandtl-m), designed with the idea that it could sail through the thin atmosphere of the Red Planet.

The Prandtl-D No.3's design is slightly different from that of the first two Prandtl-D aircraft, Bowers said. The shape of the glider wing features a twist that "could lead to an 11-percent reduction in fuel consumption," NASA officials said in the statement.

Prandtl-D No. 3 has a 25-foot (7.6 m) wingspan — more than double the wingspans of previous versions. Despite its larger wingspan and weight, the "wing loading" — the relationship between its weight and its wing area — is about half those of previous prototypes. According to Robert "Red" Jensen, the Prandtl-D chief pilot, this lower wing loading makes the glider "very, very nice; very majestic; and very stable" during flight.

Light, remotely piloted aircraft have been discussed as an efficient way to move around Mars, but the challenge is that the Red Planet's atmosphere is much thinner than that of Earth. Prandtl-m, if it ever flies on Mars, is envisioned to fly for about 10 minutes through the Martian atmosphere after separating from a parent spacecraft. It would get high-resolution pictures of the planet's surface from a much closer range than a satellite could, NASA officials have said.

The carbon fiber, foam and fiberglass prototype was launched by a bungee cord on Oct. 28. NASA is considering releasing Prandtl-D from a remotely controlled tow plane in future testing.

http://m.space.com/31077-nasa-drone-glider-aces-test-flight.html

Return to Top

Deep Learning for Commercial Autonomous Drones

MENLO PARK, Calif.--Kespry, a commercial drone system company, today demonstrated a prototype drone that uses NVIDIA artificial intelligence technology to recognize objects.

The state-of-the-art Kespry prototype uses an NVIDIA Jetson TX1 module for deep learning, which offers complex algorithms to make autonomous devices more intelligent. The prototype is based on the Kespry Drone System that is in use by customers in the materials, mining and construction industries.

“This technology has great potential for the commercial drone market,” said Paul Doersch, Founder and CEO, Kespry. “Today, Kespry customers already use aerial data gathered by our drones to calculate distances, sizes, and volumes. With NVIDIA’s new machine learning module, companies will be able to specifically identify construction vehicles, building materials and other structures, so they'll have even more relevant information to manage their job sites using commercial drones.”

The demo was conducted using the NVIDIA Jetson TX1 embedded module which was unveiled today at an NVIDIA event in San Francisco. Jetson TX1 is a credit-card sized module that will enable a new generation of smart, learning autonomous devices. With its 1 teraflops of performance, Jetson delivers exceptional performance for machine learning, computer vision, GPU computing, and graphics, while drawing very little power.

“Kespry’s prototype drone with Jetson TX1 is a vision of the future, when robots and drones will see, think and navigate on their own,” said Deepu Talla, VP and GM, Tegra, NVIDIA. “Jetson TX1 will enable a new generation of incredibly capable autonomous devices.”

To see a video about “NVIDIA and Kespry Demo Artificial Intelligence Prototype,” please visit:
https://youtu.be/l4MaoT3au-c

http://www.businesswire.com/news/home/20151110007046/en/Kespry-NVIDIA-Demonstrate-Deep-Learning-Commercial-Autonomous

Return to Top

COUNTER UAS:

Companies Tout Weaponry to Destroy, Disrupt Small Drones

WASHINGTON — With the proliferation of small commercial drones posing a new threat to military and civilian targets, several defense firms are selling counter unmanned aerial system capabilities, from lasers to point-and-shoot devices.

Boeing’s Compact Laser Weapon System (CLWS), which quickly set a small drone on fire during a demonstration in August, is offering a lethal counter measure. The platform, which can be attached to anything from an Apache helicopter to a Bradley tank or operated on a standalone tripod, can bring down a small UAS up to three kilometers away. It is also accurate enough to degrade and disable a drone’s Intelligence, Surveillance and Reconnaissance sensors at a distance of up to seven kilometers.

“At that distance, for counter ISR, you can take out their optics,” said Jessica Etts, of Boeing’s strategic missile & defense systems division. In an environment where adversaries can send up a fleet of quadcopters with Go-Pro cameras attached, this offers an inexpensive counter measure, she said.

Battelle has developed a lightweight, portable system that uses radio frequencies to disrupt an intrusion without causing damage to the drone or risking collateral damage to people who may be nearby.

"Our disruptive signal basically replicates the drone going out of range from its radio control operator," said Dan Stamm, the program manager for Battelle's DroneDefender system. When this happens, most drones do one of three things: hover in place, return to base, or find a nearby place to land.

Battelle's system, which vaguely resembles a rifle with an antenna attached, has a range of hundreds of meters (company officials declined to be more specific), and is directional, so it won't affect nearby electronic systems. Units weigh 15 pounds or less, and can be operated by one person.

The system doesn't detect or identify the intruders. But if a user has a line of sight on a drone, all he or she has to do is point and shoot to interrupt its mission.

"The laws and regulations are written right now such that only federal organizations would be authorized to use the device," Stamm noted.

Lockheed Martin has developed the ICARUS system, which uses video, audio and radio frequencies to detect, identify and disable an unwanted UAS.

Analyst estimates put the small drone market as a $1.6 billion industry that is likely to grow rapidly, possibly exceeding $5 billion annually by 2020.

"As more of these systems proliferate, the malicious use of them by adversaries is likely to increase as well," Panczenko said. "The need for systems to detect and counter them will also go up."

http://www.defensenews.com/story/defense/2015/11/04/companies-tout-weaponry-destroy-disrupt-small-drones/74233198/

Return to Top

INTERNATIONAL:

European Maritime Agency Demo for Portuguese UAV

Tekever is proceeding with a demonstration of a maritime surveillance system using UAVs for the European Maritime Safety Agency (EMSA) and the European Space Agency (ESA). The Portuguese technology company was selected for the two-year Rapsody project by the two agencies last December. In what it claims to be a first, Tekever will demonstrate the value of using UAVs in search-and-rescue missions, and in monitoring pollution and oil spills from ships.

Tekever is using its AR5 Evolution for the demo, one of a family of small-to-medium UAVs that it has developed. The AR5 is a conventional takeoff and landing autonomous UAV with a wingspan of 4.3 meters, a payload of 50 kg, and an endurance of 8 to 12 hours. It will carry various sensors, including HD video, SAR, Lidar and AIS, the maritime equivalent of IFF. Satcom will be provided by ViaSat. The sensors

will be integrated by Tekever's subsidiary in the UK, and the demonstration will be managed by another UK company, Bond Air Services.

Tekever also has subsidiaries in the U.S., China and Brazil, where it bought into Santos Labs, a local maker of UAVs. The two companies have since jointly developed the AR2 Carcara, a small UAV for maritime and amphibious operations that has a waterproof airframe. Tekever's hand-launched UAV is designated the AR4 LightRay, and has been in service with the Portuguese Army for the past three years.

http://www.ainonline.com/aviation-news/defense/2015-11-05/european-maritime-agency-demo-portuguese-uav

Return to Top

COMMENTARY:

Welcome to the arms race for anti-drone weaponry

Prisons have a drone problem. In August, a drug-carrying drone was caught ferrying half a pound of various drugs into Ohio's Mansfield Correctional Facility, sparking a full-blown fight when it landed in the yard. A year earlier, a similar landing took place at a maximum security prison in South Carolina, followed by another in Australia. At the same time, French officials struggled with a rash of unexplained flights near nuclear plants, suggesting the threat isn't limited to prisons.

It's a classic technological imbalance: for a few hundred dollars, anyone can buy a machine capable of out-flying most of the security measures in place at an open-air facility. The FAA's drone registration proposal may even the odds a little, but law enforcement agencies are still surprisingly out-gunned if they need to take down a hostile drone. Short of shooting it down, what can a police officer or prison guard do?

The jamming itself is also illegal, presenting an even trickier legal problem. The FCC has a blanket ban on jamming devices, and there's no carveout expected for anti-drone technology. Federal agencies can get around the provision, since they report to the NTIA rather than the FCC, but the rule cuts out the vast majority of law enforcement, including state prisons like Mansfield. It also means that when the Drone Defender goes on sale to law enforcement next year, it will reach only a fraction of the agencies that might use it.

The cheaper alternative is to stop drones from lifting off in the first place. When Queen Elizabeth christened the Brittania this summer, UK police preemptively cleared out areas where a paparazzi drone operator might set up, using analytics from a local company called Cunning Running Ltd. Since operators need a line of sight, analysts were able to provide a limited space to clear.

Still, that tactic won't help in situations like Mansfield where the threat is effectively indefinite. In those cases, law enforcement is left waiting for a technical or regulatory fix that may not be coming any time

soon. In the meantime, drone pilots will have a serious technical advantage over anyone who wants to take one down.

http://www.theverge.com/2015/10/29/9631208/drone-defender-regulation-iacp

Return to Top

The future of ISR is unmanned, whether commanders like it or not

The Global Hawk, favored by Congress, is capable of 30-hour flights.

It's no secret that unmanned aerial systems are a favorite tool of the military when it comes to counter-terrorism operations and intelligence, surveillance and reconnaissance, or ISR. But this singular preference seems to translate only to medium-altitude, long-endurance aircraft, or MALE, such as the MQ-1 Predator and its larger cousin, the MQ-9 Reaper, both of which can be outfitted with lethal payloads. Up at higher altitudes, support for UAS isn't so uniform.

The battle concerning high-altitude ISR has been billed as a face-off between the Air Force's RQ-4 Global Hawk – capable of staying aloft at 65,000 feet for over 30 hours – and the Cold War relic U-2, which is listed as having an unclassified ceiling of 70,000. The U-2 has its advantages, although the aircraft's nickname, Dragon Lady, is a reference to its "unforgiving" nature that makes it very difficult for the lone pilot to fly. As such, there are a limited number that can perform the 10-hour flight missions required to fly the U-2.

The Air Force has been back and forth on the issue. For years, the service wanted to shutter the Global Hawk program in favor of keeping the U-2, which at the time cost less to operate, but met stiff resistance from Congress, which favored the Global Hawk. The Air Force then reversed its position in March this year, after the operating costs for the Global Hawk Block 30 fell below those of the U-2.

While the Air Force will not procure any additional Global Hawks, as outlined in the most recent budget proposal, the service announced earlier this year it would spend $4 billion on the program over the next

five years and in late September awarded Northrop Grumman a contract worth up to $ 3.2 billion for modernization and maintenance, which could include upgrades to the aircraft's electro-optical sensors.

"The Global Hawk's going have so much crap hanging off of it, it's not even going be able to take off," she said to the audience, in reference to Congress's insistence on using the Global Hawk to solve all ISR challenges. According to Air Force fact sheets, the U-2 holds a 2,000 pound greater payload capacity than the Global Hawk.

"The world of manned reconnaissance is gone, and soon manned reconnaissance itself will be gone," Charlie Allen, former assistant director of central intelligence for collection at the CIA, said in a recent interview with Breaking Defense. "I think we'll move almost solely to unmanned reconnaissance, whether it's long range in the class of Global Hawk or whether it deals with Predator A's (or) Predator

B's," he said, also indicating that the shoot down of Gary Powers' U-2 over Soviet territory in 1960 is one of the driving factors; "If you lose one [UAS], you will not have lost a pilot," he said.

However, McDonald disagrees with the notion that the U-2 and Global Hawk should be compared as competing systems and warned that the issue should not be viewed necessarily as manned vs. unmanned, since both the U-2 and Global Hawk are complementary systems, each better poised for certain mission sets. "It's not one really is better than the other. It's that they are very complementary in what they do…they're very hard to compare because they're so good at helping each other out," he said. This echoes what Air Force Lt. Gen. Robert Otto, deputy chief of staff for ISR, has said, that "going manned or unmanned is 'really mission specific.'"

Unfriendly skies

"The way of the future is through unmanned reconnaissance. For a whole variety of tasks, using a wide range of payloads. Certainly for non-denied areas," Allen said. "For denied areas, there will be, inevitably, systems that will be used for denied areas as well. That's all I can say about that." Manned aircraft typically fly faster than UAS and are more easily maneuverable – and have the advantage of the quick reaction abilities of pilot in the cockpit as opposed to one working remotely.

Otto lauded the endurance capabilities of unmanned systems, given that humans are limited by a 13-hour window while systems such as the Global Hawk can fly for 30 hours. But there is no substitute for a pilot in the cockpit if outside circumstances or conditions create complications. "We also have found, like in Afghanistan and Iraq, that when the weather's kind of crummy, manned airplanes have a higher mission success rate because there's somebody there that can dodge the weather and understands the intent and can work their way to a successful mission accomplishment," Otto said. "So while I think the

future looks bright for unmanned airplanes, and especially in unmanned reconnaissance, I do believe that there are some roles today that manned airplanes are a better fit."

Presently, the future of high-altitude ISR appears to be unmanned, more because of budgetary restriction than the advanced capabilities of UAS. If combatant commanders had their druthers, they have both manned and unmanned flights. But that's unlikely. McDonald and almost all other combat commanders just want more ISR, regardless of the platform, provided it meets mission requirements. "Whether our leaders decide that the U-2 or the Global Hawk is the way to go – they've decided the Global Hawk is," McDonald said. "If money wasn't an object – I can't imagine living in that world 'cause money is always an object…I would buy more" ISR.

https://defensesystems.com/Articles/2015/11/04/U2-Global-Hawk-future-of-ISR-debate.aspx?admgarea=DS&m=1&Page=1

Return to Top

The drone pro

Frank Galella's new flying machines cost about as much as a 30-year-old Cessna with four seats; a decent, mid-time engine; and a reasonably recent panel. He has paid more than $50,000 for a single octocopter, has assembled a fleet of them, and while they won't take him places like his Cessna T182T Turbo Sklyane does, they can take high-end cameras weighing several pounds to places where no such camera had been until just a few years ago. The footage is smooth, detailed, and in demand. Corporations looking for glamorous fly-bys of their headquarters and luxury resorts eager to show off amenities and scenic locales are among the clients who have hired Galella and his crew—at $3,250 a day—to drone them right.

Each aircraft (and they are legally aircraft, with FAA registrations) has redundant autopilot and GPS systems. Professional unmanned aircraft pilots train to handle failures, including the loss of one or more motors. This is one of the reasons Galella uses octocopters for every job: They can lose one motor and continue flying with no noticeable difficulty, and the models Galella fits with custom features and systems can survive even a second motor failure, which has yet to happen, protecting the very expensive cameras they carry as well as people and property.

Galella and others who secured FAA approval for unmanned commercial operations had to create documentation and procedures for flight operations that are largely adapted from GA. He compared the process to securing a charter certificate under Part 135.

While the FAA may change the requirements next year, certificated pilots are required to be in command of each unmanned flight, and also required to keep the aircraft in sight at all times. The FAA now allows Section 333 operations below 200 feet agl and more than five miles from an airport under a blanket authorization. Commercial operators must file notams in advance of each flight and keep monthly logs of flight data. If the job requires it, they may apply for specific authorization for operations

outside of the aforementioned airspace limitations, and Galella has done this, too, operating within Class D airspace (with FAA approval) to film for a corporate client.

That, he said, was a first. There will likely be more to come.

Galella said his Section 333 approval was also a first in that it specifically lists an education mission along with commercial flights, and he's eager to demonstrate the technology for aviation professionals, firefighters, police, and civic organizations. He is particularly keen to work with pilots, air traffic controllers, and others involved with manned aviation, hopeful that knowledge will help ease concern about and distrust of unmanned aircraft and their operators that persists among many manned aircraft pilots.

"In the middle of that you have the hobbyist, or the off-the-street individual with no aviation background (who) decides to wander into off into territory where they think they have a potential income," Galella said. He estimates that this group accounts for no more than 20 percent of the drone-flying public. "They're intrigued by the idea. They go out and they buy an off-the-shelf product that is still very capable and still very dangerous but yet they have no knowledge of it, and they're not

interested in learning. Those are the people who keep showing up in the news, you know, in a negative spotlight, and those are the people that really need to be educated."

Frank Galella sees opportunity, both economic and otherwise, in unmanned aircraft.

"We've seen a significant reduction in aircraft owners, pilot graduations, you know, for whatever the reason may be," Galella said. He ticked off a list of jobs that are being created as unmanned aircraft take off, including jobs for certificated pilots (required for all current commercial unmanned operations), as well as maintenance and repair, insurance, legal services, and video production. Add to that the many missions unmanned aircraft excel at beyond photography, including mapping, monitoring crops, and inspection of power lines, bridges, and other infrastructure.

"This industry with the UAV certainly opens up a broad spectrum of job development and job creation," Galella said. "This is going to be every bit as big as manned (aviation) in the next decade."

http://www.aopa.org/News-and-Video/All-News/2015/November/04/The-drone-pro?WT.mc_id=151106epilot&WT.mc_sect=tec

Return to Top

Federal Standards Keep Young Pilots from Manning Drones

GRAND FORKS, N.D. -- Megan Halek could be the best unmanned aircraft pilot coming out of the University of North Dakota's highly regarded aviation program this year: She's aced a training program and has enough air experience to fly private jets worldwide.

"The CBP has their standards, and rightly so. They're looking for qualified people," said UND aviation professor John Bridewell, who is Halek's faculty adviser. "But at some point you have to question if there's a tradeoff between someone who simply has hours and this particular certificate versus someone who has capabilities and wants to be there."

Updating hiring practices is a debate worth having, given the many job openings on the horizon among its 1,200-strong staff, according to Max Raterman, who directs the CBP's Air and Marine Operations in Grand Forks.

The Predator drone -- a $13 million piece of equipment -- is the most difficult plane, manned or unmanned, that Bodin said he has to land. It's harder to feel connected to a drone, he said.

"When you are flying a real airplane you can feel that kinetic sense, you have a peripheral view. You can sense the ground coming up, stuff like that," he said. "With the unmanned, there's no sound, there's no feeling, there's no rumbling or anything in there.

http://www.military.com/daily-news/2015/11/09/federal-standards-keep-young-pilots-from-manning-drones.html?ESRC=eb.nl

Return to Top