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:

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NAVY/USMC:

DARPA, Northrop Move to Develop VTOL Aircraft

Unmanned tail sitter aircraft could prove a prototype for ship-based use.

WASHINGTON – The Convair XFY-1 Pogo of the 1950s is one of those famous aviation "funnies" – a weird, experimental aircraft intended to take off and land vertically. The "tailsitter" aircraft might have been the prototype for a new class of fighter that could take off and land from almost any ship with a flat deck.

Known as TERN, for Tactically Exploited Reconnaissance Node, the project is a joint program between the Defense Advanced Research Projects Agency (DARPA) and the U.S. Navy's Office of Naval Research. Northrop Grumman was recently chosen to build a full-scale demonstrator system of the medium-altitude, long-endurance unmanned aerial system (UAS).

"The design we have in mind for the TERN demonstrator could greatly increase the effectiveness of any host ship by augmenting awareness, reach and connectivity," Dan Prat, DARPA program manager, said in a Dec. 28 press release.

"We continue to make progress toward our goal to develop breakthrough technologies that would enable persistent ISR and strike capabilities almost anywhere in the world at a fraction of current deployment costs, time and effort," he added.

Northrop beat out AeroVironment for the Phase 3 portion of the TERN program and was awarded a $93 million contract on Dec. 24. Northrop reportedly will also contribute $39 million to the effort.

The Northrop TERN model, first shown on Dec. 11, is a flying-wing tailsitter design with a four-point landing wheel configuration, powered by twin, counter-rotating propellers on its nose. The aircraft will take off and land vertically, transitioning to horizontal flight to carry out its mission.

DARPA, in its Dec. 28 release, acknowledged the TERN demonstrator will "bear some resemblance" to the XFY-1 Pogo.

"Moving to an unmanned platform, refocusing the mission and incorporating modern precision relative navigation and other technologies removes many of the challenges the XFY-1 and other prior efforts faced in developing aircraft based from small ships," Patt said in the DARPA release.

The system produced under the Phase 3 effort, DARPA said, will be able "to use forward-deployed small ships as mobile launch and recovery sites. Initial ground-based testing, if successful, would lead to an at-sea demonstration of takeoff, transition to and from horizontal flight, and landing – all from a test platform with a deck size similar to that of a destroyer or other small surface-combat vessel."

DARPA and the Navy, under a June 2014 memorandum of agreement, are sharing responsibility for the development and testing of the TERN demonstrator system. The Marine Corps Warfighting Laboratory, DARPA added, has also expressed interest in the program.

http://www.defensenews.com/story/defense/naval/2015/12/29/darpa-onr-northrop-tern-pogo-vtol/78034916/

DARPA advances its remote-triggered deep-sea device that will store payloads and rapidly lift them to the surface - UAS

It has the trappings of a science-fiction film: Robot pods soundlessly lie in wait on the ocean floor until summoned to the surface, launching drones capable of hibernating inside the capsules for years at a time. But this scenario is far from fantasy thanks to the Defense Advanced Research Projects Agency's Upward Falling Payload program.

The capsules, known as UFPs, could be remotely triggered by the Navy when it requires surveillance or aerial support. Operators, even if positioned hundreds of miles away from the pods, could activate nodes on the devices to send them floating to the water's surface—falling upward. "The idea of UFP is to pre-deploy them far in advance, and then they will be there when you need them," says Jeffrey Krolik, the program manager in the Defense Advanced Research Projects Agency's (DARPA's) Strategic Technology Office.

The pods also were designed to save the military energy costs. The drones would not require fuel because they would be powered with energy generated by ocean currents.

Developers envision the UFP comprising three subsystems: the deep-ocean, pressure-tolerant "risers," or tubes, that would come to the surface on command; the encased payloads or platforms, such as unmanned aerial vehicles (UAVs) or buoy sensors; and the communications system to trigger the risers to launch across great distances.

DARPA has partnered with five companies on the $22 million multiyear project, now in its second phase. The businesses include Lockheed Martin, General Dynamics, Boeing, Sparton and Global Aerospace Corporation (GAC).

Krolik predicts the U.S. Navy will be the largest user of the technology as the service looks to autonomous systems to reduce costs and eliminate complexities that diminish its inventory of weapon systems and platforms. "Unmanned systems and sensors are commonly envisioned to fill coverage gaps and take action at a distance," Krolik says. "[The Navy has] a need to get these unmanned assets far forward and call them up from long ranges in a short period of time."

Roughly half the world's oceans measure deeper than 2.5 miles—providing optimal conditions for concealment and storage of UFPs, he adds. "If you are going to pre-deploy them, though, you better put them in a place where they are going to be there when you need them and the adversary can't get to them," Krolik advises

 "Generally, there is an assumption that most of the emails and phone messages that we send back and forth without thinking about it occurs through satellites, when the fact of the matter is that's not the case," states Collins, also a professor of safety, security and emergency management at Eastern Kentucky University. An estimated 99 percent of U.S. and international data and phone traffic is transmitted over the 285 undersea cables that flow from the United States to other countries.

The system's vulnerability was highlighted recently following reports of increased Russian sea activity around the globe, and notably, deep-sea submersible craft spotted last fall off U.S. shores in the Atlantic Ocean. In 2013, Internet traffic across the cables measured 5 gigabytes per capita, with demand projected to triple by 2018, she says. Increased demand means increased reliance on the cables, which means increased desire by adversaries to take down the network. The cables are owned and maintained by private telecommunications companies, and the military and intelligence communities have access to 22 redundant, or "dark," secret cables.

http://www.afcea.org/content/?q=Article-falling-ocean-floor

Fire Scout Proves Worth on Destroyers

THE PENTAGON – While the MQ-8 Fire Scout is aligned to U.S Navy small surface combatants – including the Littoral Combat Ship (LCS) – for surface-warfare and mine-countermeasure missions, the unmanned helicopter has been making a mark with Navy destroyers and frigates as well, according to a recently released Pentagon Selected Acquisition Report (SAR).

The MQ-8B variant completed over 14,000 operational flight hours while deployed aboard guided-missile frigates supporting Africa Command Joint Emergent Operational Needs Statement, AF-0002, and supporting the Intelligence, Surveillance, and Reconnaissance Task Force in Afghanistan, the SAR says, noting the initial operating capability for this variant was declared on March 31, 2014.

The MQ-8C variant completed more than 330 flight hours of developmental testing, the SAR says. Dynamic Interface testing aboard the guided-missile destroyer USS James Dunham was completed successfully in December of 2014, in advance of operational testing slated for this past fall.

The MQ-8 Fire Scout program went through a Nunn-McCurdy cost breach review in 2014 due to a unit cost increase in fiscal 2015, the SAR says. The department certified a restructured program to Congress on June 16, 2014. The restructured program that was certified includes the MQ-8B air vehicles purchased under the original Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle program of record; MQ-8C air vehicles bought under the Department of the Navy's Rapid Deployment Capability procurement process; an additional 21 MQ-8Cs to be procured to complete the program Fleet requirements of 70 air vehicles – 61 procurement and nine research, development, testing and evaluation aircraft; and associated mission control stations, Unmanned Aerial Vehicle Common Automatic Recovery Systems and support equipment.

The restructured program also includes endurance upgrade, radar, and weapons capabilities.

A Milestone C for the restructured MQ-8 program is scheduled for the second quarter of fiscal 2016, when a new acquisition strategy will be prepared.

http://aviationweek.com/aerospace-daily-defense-report

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U.S. Navy Plans to Fly First Drone Swarm this Summer

What happens when a swarm of slow, low-performance drones attacks a modern warship? With defense systems able to knock down supersonic cruise missiles and fast jets, small drones ought to be a turkey shoot. In fact, the situation plays out very differently.

The U.S. Navy is a leader in the area of swarm warfare, the threat has been analyzed in a number of papers from the Naval Postgraduate School analyze the threat. Some of these are classified, but a 2012 paper by Loc Pham, "UAV Swarm Attack" is open and makes uncomfortable reading.

The paper posits a simple scenario: a Navy destroyer is attacked by five to ten drones simultaneously from all directions in conditions of good visibility. The drones are assumed to be made of off-the-shelf hobbyist components, controlled covertly from a nearby fishing vessel. Some of them are visually guided, others resemble the Israeli "Harpy" loitering drone which has radar guidance.

The team ran several hundred simulations, and found that on average 2.8 out of eight attackers got through. Even when the defenses were substantially upgraded – better sensors and more machine guns and Phalanx – at least one drone gets through every time. And that's just with eight drones incoming. With a larger number – ten, twenty, fifty – the defenders would still only get the first seven or so.

This weakness means it makes sense to attack a ship with a large number of cheap drones than one missile costing the same, and that's exactly what the Navy's Low-Cost UAV Swarming Technology (LOCUST) program aims to do. The aim is to have thirty drones flying together without having to be individually controlled, maintaining separation safely like a flock of birds. They are different from any other drone in that the operator does not control an individual aircraft, but pilots the whole swarm as a single unit.

The UAV Swarm Attack study highlighted the weakness of current defenses against swarms of drones. Timothy Chung, a scientist at the Naval Postgraduate School in Monterey, is looking at defensive swarms to take out the attackers. His project's official name is "A System-of-systems Testbed for Unmanned Systems Swarm versus Swarm Development and Research," but Chung calls it "Aerial Combat Swarms."

Chung is staging a contest for swarms of small drones carry out simulated battles as a way of evaluating tactics and technology. His basic scenario is a 50-versus-50 encounter in which the Blue defenders attempt to stop Red attackers from getting through. Nobody knows much about drone-versus-drone combat yet, especially on this scale. How much autonomy do the drones need? How can the swarm commander stay in control in a fast-moving action? How do quality and quantity balance out in battling swarms?

When a swarm of drones heads for an American carrier some time in the future, they might be intercepted by a defensive swarm. What happens next – whether the aircraft on the carrier's deck are destroyed, or whether the attackers are beaten off – will depend on which side has the best grasp of an entirely new form of warfare.

http://defensetech.org/2016/01/04/u-s-navy-plans-to-fly-first-drone-swarm-this-summer/

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ARMY:

Army retires Hunter UAS

The Army's Hunter unmanned aircraft system, its oldest unmanned aircraft, has been retired.

The final flight was performed during a ceremony December 16 at Robert Gray Army Airfield at Fort Hood, where the 15th Military Intelligence Battalion is transitioning to the Gray Eagle UAS.

"After two decades on Fort Hood, the Hunter is being transferred to government-owned, contractor-operated units supporting operations overseas," said an Army news release.

The Hunter was the first UAS to be actively employed by the Army. Initially fielded in 1995, the aircraft was deployed on worldwide operations, including Afghanistan, Iraq and Kosovo.

http://www.c4isrnet.com/story/military-tech/uas/2015/12/28/army-retires-hunter-uas/77970612/

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Damage claims in JLENS balloon escape top $300,000

The Army has received more than $300,000 in claims from a dozen people who say their property was damaged when one of the massive surveillance balloons anchored at Aberdeen Proving Ground escaped in October.

The unmanned balloon, which carries radar designed to spot airborne threats targeting Washington, broke free of its moorings Oct. 28 and drifted 160 miles north. It trailed 6,700 feet of cable as it traveled at an average speed of 40 miles per hour.

It snapped power lines as it floated across rural Pennsylvania, and communities along its path reported power outages. It finally came to rest in Moreland Township, north of Harrisburg.

APG balloon was supposed to deflate automatically, document says

The balloon and its twin were stationed at Aberdeen Proving Ground as part of a three-year test of the system's ability to identify and direct fire toward incoming cruise missiles and other threats. Both are now grounded indefinitely while the Army investigates why one broke free.

JLENS — the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System — was designed to protect the United States. But after $2.7 billion in funding and more than a decade of research, it had yet to show conclusive results.

Congress cut the program's budget significantly this month in the bipartisan omnibus spending bill. Key lawmakers have said they're waiting on the results of the Army's investigation before deciding whether to kill the program entirely.

http://www.baltimoresun.com/news/maryland/bs-md-balloon-claims-20151229-story.html

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USAF:

US Air Force bases report increase in near-collisions with drones

The Air Force revolutionized drone warfare. Now it's finding itself on the defensive.

Rogue toy drones – a hot-selling Christmas gift this season and last – are starting to interfere with military operations at several bases across the country. With sales of consumer drones expected to approach 700,000 this year, military officials say they are bracing for the problem to get worse and are worried about the potential for an aviation disaster.

Last month, an Air Force A-29 Super Tucano aircraft reported a near midair collision with a small rogue drone over the Grand Bay Bombing and Gunnery Range in Georgia, Air Force officials said.

In June, an Air Force KC-10 aerial refueling tanker flying over the Philadelphia suburbs at an altitude of 3,800 feet was forced to take evasive action and barely avoided striking a football-sized drone that passed within 10 feet of its right wing, officials said.

There have been at least 35 cases of small drones interfering with military aircraft or operating too close to military airfields in 2015, according to reports filed with the armed forces or the Federal Aviation Administration.

That's a small fraction of the estimated 1,000 reports received by the FAA this year of small drones interfering with civilian air traffic or coming too close to passenger airports.

But military officials, who once thought the remote locations of their airfields and restricted airspace offered a measure of protection from wandering drones, said they are no longer immune.

Cmdr. William Marks, a Navy spokesman at the Pentagon, said Navy pilots or air-traffic controllers at U.S. bases have reported close calls or encounters with unauthorized drones 12 times in the past three months. Prior to that, the Navy was recording an average of less than one incident per month.

One military airfield that has experienced multiple risky encounters with drones is the Marine Corps Air Station in Yuma, Ariz.

In May, a Marine Corps Harrier jet coming in for a landing at Yuma reported a drone about 100 feet off its right side. In July, a Navy T-45 Goshawk training aircraft flew within 100 feet of another drone about five miles west of Yuma, according to FAA records.

Prior to last year, close encounters with rogue drones were almost unheard of. But rapid advances in technology and falling prices have led to a boom in sales – and a corresponding surge in reports of air-traffic chaos.

Under FAA guidelines, drone pilots flying for recreation are supposed to keep their aircraft below 400 feet and at least five miles away from airports. Regulators, however, have been largely unable to enforce those guidelines.

In an attempt to bring a measure of order to the skies, the FAA on Monday began requiring all recreational drone owners to register online with the agency and to affix identification numbers on their aircraft. More than 45,000 people registered in the first two days. The FAA said it expects that as many as 400,000 small drones could be sold during the holidays.

In anticipation of more difficulties to come, the Air Force last week began a new campaign to educate its pilots, flight crews and air-traffic controllers about the hazards posed by small drones.

Steven Pennington, the Air Force's director of bases, ranges and airspace, said many consumer drones are only 2 or 3 feet in diameter. At that size, pilots usually can't see them until they're within 600 feet – giving the pilots just a second or two to react before the military aircraft whiz by.

Pennington likened the aviation threat posed by small drones to those of large birds, which can weigh anywhere from two to 15 pounds. The difference, he said, is that drones contain hard plastic or metal, like their lithium battery packs. If a drone were to get sucked into a military jet engine, he said, "We're relatively certain it would be a significant problem."

Military Areas Deal With New Threat: Toy Drones

As sales soar, officials increasingly worry about an aviation disaster

The Air Force revolutionized drone warfare. Now it's finding itself on the defensive.

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More than 45,000 people registered in the first two days, overwhelming the system and forcing the FAA to take it offline temporarily for repairs.

The FAA said it expects that as many as 400,000 small drones may have been sold during the holidays.

https://www.washingtonpost.com/news/checkpoint/wp/2015/12/24/rogue-toy-drones-interfering-with-military-operations/

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NATIONAL AIR SPACE:

Chicago Executive Airport Drone Campaign

Chicago Executive Airport (CEA) officials have launched a campaign warning residents and people in neighboring communities of the FAA's new drone guidelines and the airport's own suggestions. Staff members have passed out fliers warning residents that flying drones near airports is "highly discouraged and dangerous."

The airport, which is co-owned by Wheeling and Prospect Heights, also has drone safety information and resources on its website.

CEA spokesman Rob Mark says "If you live in the area, please stay away from the airport -One of those going through a (airplane) window or getting caught in an engine is not good."

Current guidelines from the FAA strongly discourage anyone from flying a drone within a 5-mile radius of any airport. This means that flying a drone anywhere in the Wheeling area is discouraged.

Mark adds that drones have been spotted near the airport recently.

"When I talked to the tower manager last week, he said he's been seeing them for a couple months now," Mark said. "And coming from all directions."

When someone working in the control tower spots a drone, Mark says, they can't do much but treat the unmanned aircraft like they would a flock of birds — announcing the location and advising pilots to keep an eye out.

Wheeling Village Attorney Jim Ferolo agreed with a concerned Trustee Ken Brady on Monday that the village could do more to regulate drones.

"From the municipal perspective we have the ability to regulate up to 400 feet," Ferolo said. "We should look into our ability to restrict it related to flight patterns."

Ferolo added that drones become a municipal problem when they're flying over private property.

It became illegal to fly a drone within a 5-mile radius of both O'Hare and Midway airports after the Chicago City Council passed an ordinance in November. Chicago also created no-fly zones over private property, schools, churches, hospitals and police stations without consent.

Mark says he distributed drone information to municipal officials in Wheeling, Prospect Heights, Buffalo Grove, Arlington Heights, Palatine, Deerfield, Northbrook and Glenview on Tuesday.

http://www.uasvision.com/2015/12/28/chicago-executive-airport-drone-campaign/?utm_source=Newsletter&utm_campaign=aefd8a9b1e-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_799756aeb7-aefd8a9b1e-297560805#sthash.77ww4BXK.dpuf

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FAA drone ban extended 30 miles beyond DC

WASHINGTON (WUSA9) – Area drone hobbyists are disturbed about recent emails announcing the extension of FAA's "no drone zone" deeper into Virginia and Maryland in a 30 mile radius beyond the District.

"So, anyone who flies drones or RC airplanes or anything within 30 miles of DC is now officially grounded," said hobbyist Cyrus Phillips... "That came out on Christmas Day."

He said the notice effectively closes the Capital Area Soaring Association and all other hobbyist parks within 30-miles.

Drone violations and arrests have led to public awareness of the ban in D.C., but this ban goes deeper than ever before and is the same as the no flying zone restricting heavy, commercial aircraft.

A search of the FAA's website showed conflicting language from "anywhere in" the district on one page, to banning drones within a 15-mile radius of the District in another, but deep within the FAA site is a document mentioning the 30-mile ban.

It took a day of e-mails and phone calls for WUSA9 to confirm the ban with FAA officials.

"It is important for you to tell your viewers that they cannot fly in the 30 mile radius," said an FAA official on background. "The FAA will continue to do outreach to educate the public."

The FAA said an official notified clubs to let them know police will be enforcing the ban.

http://www.wusa9.com/story/news/local/dc/2015/12/28/dc-drone-ban-30-miles/77993596/

Meanwhile, reporting online, WRC-TV Washington's News 4 Today (12/28) adds that the FAA is upgrading its radar systems to detect UAVs, and notes that the devices are not allowed within a 30-mile radius of Reagan National Airport.

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Drone Laws Set Up Clash between Feds and Local Authorities

Stricter local laws square off against FAA's own planned regulation.

With more than 1 million new drones expected to take flight after the Christmas holiday, a battle is stewing between federal and local regulators about how to best regulate the new technology.

The Federal Aviation Administration is muscling in on local and state laws regarding the regulation of drones—still a nascent form of technology that has lured companies like Amazon.com (AMZN 2.50%) and casual users, according to the New York Times. But what hasn't yet been determined: how to best allow the technology to soar without risking life and limb to those on the ground.

The FAA is aiming to establish greater control of the technology, earlier this month issuing a sweeping statement that says local and state laws should "be consistent with the extensive federal statutory and regulatory framework" pertaining to the airspace.

That may be giving the feds a little too much credit. Local authorities lament federal authorities aren't enforcing the rules, and that's why cities like Miami are aiming to tackle the issue themselves, the Times reports. Over 20 states have implemented their own drone laws this year alone while many cities have also approved their own tough regulations.

http://fortune.com/2015/12/28/drone-laws-clash/

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Drone brought down after flying near president's motorcade

KAILUA, OAHU (HawaiiNewsNow) - A drone flew near the president's motorcade as it left Kailua for Alan Wong's on Monday evening.

The drone zipped next to the motorcade for about three seconds, a pool reporter said.

Pool reports said Secret Service agents approached the man operating the drone and the device was brought down shortly afterward.

The motorcade's route did not change and no arrests were made.

The Secret Service says the man had no idea that the president's motorcade would be passing by when he launched the drone.

Before the president arrived, the FAA issued strict flight restrictions for Oahu that included drones.

http://www.hawaiinewsnow.com/Return to Top

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FAA shuts down 30+ drone clubs near D.C.

WASHINGTON — The Federal Aviation Administration has warned more than 30 drone and model aircraft clubs in the Washington, D.C. area they need to stop flying, or risk criminal and civil enforcement.

The FAA, which this month announced drone owners must register their devices with a name and home address by Feb. 19, 2016, has been concerned about the proliferation of model drones, which were top-selling holiday gifts.

Owners of model aircraft weighing up to 55 pounds have to register it with the FAA, or face civil penalties up to $27,500 and criminal penalties up to $250,000 and three years in prison.

In September 2015, as the popularity of drones continued to grow, the FAA extended a 15-mile no-fly zone surrounding Ronald Reagan Washington National Airport to 30 miles. Since Sept. 11, 2001 the FAA has cited national security issues as the reason.

In the past, operations of drones outside the Capital Beltway was considered OK — now the no fly zone extends past Dulles International Airport, as the crow flies.

Despite the expansion of the "no drone zone," approximately three dozen drone and model aircraft clubs surrounding the nation's capital have operated in large fields, providing a place for hobbyists to safely fly.

Last week the FAA sent an email to the Academy of Model Aircraft, asking the group to shut down all clubs that operate within a 30-mile radius of Reagan National Airport.

"We are hearing reports that some individuals may be flying … even though they know it is in violation of the current airspace restrictions," Brian Throop, manager of the FAA's special operations security group, wrote to the AMA and several flying clubs in the region.

Several clubs have posted notices at their facilities, and on their websites and social media sites that the FAA has requested all flying operations be discontinued.

According to Motherboard, the AMA told clubs it expected the FAA to reopen the local clubs sometime in mid-January, and said it is working with the agency to get special permission to continue operations.

http://wtop.com/tech/2015/12/faa-shuts-down-30-drone-clubs-near-d-c/

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Drone Owners Overwhelm Federal Government's Registration System

The Federal Aviation Administration appeared unprepared to accommodate the flood of new drone owners during the holiday season after requiring that Americans register their drones before liftoff.

The FAA shut down its registration page twice within two days after it launched last Monday because of high traffic.

The FAA said last week an "overwhelming number of people" successfully registered, but "a small number of users reported performance issues," driving the site operators to temporarily suspend online registration for maintenance.

The agency received more than 45,000 applications during the first two days of registration.

Jason Snead, a policy analyst at The Heritage Foundation, faulted the agency for rushing the drone registry site's launch a few days before Christmas despite the projected uptick in drone purchases.

"Since the FAA has now imposed outrageously steep criminal and civil penalties for flying an unregistered drone, if the site crashes or new drone owners can't register, they have only two options: sit on their Christmas gift until the government gets its act together, or commit a felony by flying what amounts to a toy around their yard," Snead said.

The Consumer Technology Association predicted 400,000 drones would be purchased during the holidays.

The anticipated surge in drone ownership pushed the FAA's two-month-old drone registry task force to recommend in late November that the agency establish a registration system to track those who own an unmanned aircraft system.

The FAA launched its drone registry Dec. 21, requiring that anyone who owns an aircraft weighing between 0.55 and 55 pounds register it with the federal government before launching it into flight.

Those who operated a drone prior to Dec. 21 must register by Feb. 19.

Owners who miss the deadline or fly their drones before registering could be thrown into jail for up to three years or slapped with a criminal fine costing up to $250,000.

Snead called the punishments "absurdly steep," noting that owners were given only seven days after the FAA announced its new regulations Dec. 15 to study and adjust to the new rules.

The FAA reported more than 650 unauthorized drone sightings between Jan. 1 and Aug. 9. Reuters predicted the number would increase to 1,100 by the end of the year if sightings remain consistent.

The spike in unauthorized drone sightings and the rising number of near collisions between unmanned aircraft and civilian planes drove the FAA to hastily establish its drone task force so that new regulations could be implemented before the holiday season.

But Snead said the new policy would likely do little to prevent careless or ill-intentioned drone owners from flying their aircraft into restricted airspace. The policy would also be limited in helping law enforcement track illegal drones, he added, because illicit aircraft would likely not be registered in the system.

"The FAA's registry is an ineffective rush job and should be rescinded before it traps otherwise innocent drone owners in the web of overcriminalization," he said.

The agency is not releasing the number of drones registered until free registration ends Jan. 20, the New York Daily News reported.

Registration will cost $5 after the registration period's initial 30 days.

http://dailysignal.com/2015/12/28/drone-owners-overwhelm-federal-governments-registration-system/?utm_source=heritagefoundation&utm_medium=email&utm_campaign=morningbell&mkt_tok=3RkMMJWWfF9wsRovuKTMZKXonjHpfsX56u4vXaewlMI%2F0ER3fOvrPUfGjI4ASMNrPa%2BTFAwTG5toziV8R7jHKM1t0sEQWBHm

Regulators Weigh Satellite Tracking for Delivery Drones

Federal regulators are looking for ways to ensure that drones operating beyond sight—such as delivery drones—stay away from manned aircraft, which many experts expect ultimately will harness existing satellite technology.

The preliminary plans call for relying on what is known as automatic dependent surveillance-broadcast technology, or ADS-B, a system that manned aircraft use to determine their location via satellites and periodically broadcast that data to air-traffic controllers. Eventually, the data also will be broadcast directly to other aircraft.

Federal Aviation Administration official Don Walker said at a public meeting earlier this month that drones flying beyond sight of operators ultimately "are likely to have ADS-B receivers." The receivers would enable drones to sense manned aircraft and automatically avoid them. The receivers wouldn't broadcast the drones' location, which could confound air-traffic controllers' view of the airspace.

Mr. Walker said ADS-B likely wouldn't be used for drones within sight of the operator, which include virtually all drones flying today, because that would overwhelm the system's capacity.

Mr. Walker made the comments to an industry wide standards-setting group RTCA Inc., which advises the FAA on technical standards. Mr. Walker, who is an FAA representative to the group, has been heavily involved in sketching out potential approaches to integrating drones into U.S. airspace.

On Tuesday, an FAA official said Mr. Walker wasn't expressing agency policy, because the FAA "has not taken a position regarding" the issue and isn't currently drafting any regulations mandating any particular technology or approach.

The deliberations are still at an early stage. Reaching industry and government consensus on a detailed regulatory framework is expected to take at least several years, and finalizing regulations could stretch years beyond that.

Issues such as short battery life and unreliable location data could limit delivery drones' range and require central drop-off points, rather than deliveries straight to customers' doorsteps. And proposed FAA rules, expected to be finalized next year, would prohibit drones from carrying external loads, flying over bystanders or—at least for several years—beyond the sight of their operators. The rules also would require one operator per drone, something that wouldn't work for vast fleets of delivery drones.

Jim Williams, who retired in June as the FAA's top drone official, said companies could seek exemptions from the proposed FAA restrictions, which also would likely require FAA certification of their aircraft.

The National Aeronautics and Space Administration and companies such as Alphabet and Amazon have been working on more sophisticated systems to keep drones separated from manned aircraft and from each other.

Alphabet has proposed using a system that is similar to ADS-B but is less costly to broadcast and receive aircraft locations. Amazon has suggested segregating the airspaces between manned aircraft, high-end commercial drones and more basic recreational drones. They all support a NASA plan for an automated system that keeps drones separated by calculating their flight paths based on weather, obstacles and other aircraft paths.

Some in the drone industry reject an FAA approach that specifically would require ADS-B technology. Amazon said in a statement that it supports an approach based "on safety and performance outcomes" that allows different technologies because "locking into a specific prescribed set of technologies…will quickly become outdated."

Michael Drobac, head of drone trade group the Small UAV Coalition, said an ADS-B mandate is too rigid of a regulatory approach. "ADS-B is one technology, but that doesn't mean there couldn't be other technologies that could be as efficient or as effective," he said.

What a near-miss with a helicopter taught one aviation student about drones

A few weeks ago, Owen Ouyang was piloting a small drone near his Martinez, Calif., home when the screen on his iPad went black. His DJI Phantom III had lost its signal near some power lines, so a safety feature sent it soaring.

Federal Aviation Administration guidelines specify that hobbyists' drones should stay below 400 feet. But Ouyang, who lives on a hill, with homes, power lines and antennae towers nearby, had programmed his to fly to around 750 feet to avoid any collisions during a signal loss. The problem: a California Highway Patrol helicopter searching for a stolen vehicle was in the airspace where the 23-year-old aviation student's drone was seeking safe haven.

The two aircraft nearly collided.

News reports say the pilot suddenly spotted a drone right in front of the helicopter, forcing the chopper to veer right and avoid crashing into the drone. Ouyang's drone returned home, but about 10 minutes later, a police car showed up. An officer told Ouyang he was "in big trouble."

Ouyang wasn't charged, but he said the incident was a wake-up call for anyone who thinks drones are toys akin to remote-controlled cars. He has flown a Cessna 152 and other propeller planes, but the incident that landed him in hot water involved a miniature aircraft being marketed to the masses. He's alarmed by the treatment of drones by big retailers who pitched them as consumer products that can be flown by anyone, making them one of the hottest Christmas gifts of the season.

 "They were advertised to be a toy, something that you can fly out of the box without any training," Ouyang said. "People should know that a drone is definitely not a toy … There's a lot of potential problems for those people who have no experience in aviation to get this kind of drone."

Recent Post coverage shows pilots have reported a surge in close calls with drones. Nearly 700 incidents of this nature have occurred so far this year, according to FAA statistics, about triple the number

"And despite all that, he had a near miss with a CHP helicopter. He could potentially have been in hot water. Despite somebody with a background, training, willingness, the right attitude, sort of the perfect person we would want to be out there piloting drones, we almost had this calamity."

Gregory S. McNeal, an associate professor of law and public policy at Pepperdine University whose area of focus includes drones, said it is Ouyang who was in the wrong. Ouyang, he said, "chose to knowingly disable a safety feature, allowing his drone to fly at twice the legal altitude, and now he wants to blame his choice on the device and have government impose greater burdens on people who don't make decisions to operate unlawfully."

McNeal said the existing FAA guidelines "have teeth" and are sufficient for regulating drone operation. The FAA announced new regulations in December requiring drones to be registered and marked with registration numbers in order to fly; criminal penalties for failure to do so include fines up to $250,000 and imprisonment up to three years.

That drone under your Christmas tree will have to be registered with the FAA

 "An important thing that people forget is that drones replace much riskier activities, like people climbing telephone poles, or manned helicopters filled with fuel, flying at low altitude," he said.

McNeal, however, believes the regulations currently on the books are enough. In Ouyang's case, he said, the pilot simply should have known better.

"We have enough laws for drones," he said. "We just need people to start making smart decisions."

https://www.washingtonpost.com/news/dr-gridlock/wp/2015/12/30/what-a-near-miss-with-a-helicopter-taught-one-aviation-student-about-drones/

FAA touts 'year of safety' in aviation – UAS

The Federal Aviation Administration (FAA) touted 2015 as a "year of safety and continued modernization" on Monday as lawmakers are expected to resume consideration of a new funding bill for the agency.

FAA Administrator Michael Huerta said in a blog post on the transportation department's website that "the dedicated professionals at the Federal Aviation Administration made significant progress this year as we continued to modernize and streamline the nation's air traffic system while also preparing the way for small Unmanned Aircraft Systems (UAS) to safely play a growing role in aviation."

He cited the agency's efforts to require drone users to register their devices with the federal government and the completion of an airplane navigation system known as En Route Automation Modernization as examples of improvements that were made to the nation's aviation system in 2015.

"In April, we completed the program to replace the aging computer system that had been the core technology in our network of high-altitude air traffic control centers," Huerta wrote. "The new system, En Route Automation Modernization, or ERAM, is now the backbone for our NextGen Air Transportation System, driving the display screens used by controllers to safely manage and separate aircraft.

"On the recreational front, our most high-profile accomplishment was launching a streamlined and user-friendly web-based aircraft registration process for owners of small UAS weighing more than 0.55 pounds (250 grams) and less than 55 pounds (approx. 25 kilograms) including payloads such as on-board cameras," Huerta continued.

"The registration requirement, which went into effect on December 21, is a key opportunity to educate a new generation of airspace users about the rules and regulations they must follow," he concluded. "Registration is free for the first 30 days with a rebate, then $5 after that."

The comments come as Congress is expected to work quickly in the new year on crafting an FAA bill, which is currently set to expire on March 31.

"We're working on a rule that will allow for routine commercial operations of small UAS, and we expect to have that rule finalized in the late spring of 2016," he wrote.

"In the meantime, we have been authorizing commercial operations on a case-by-case basis, with more than 2,700 authorized to date," Huerta continued. "We'll continue working with our partners to identify new outreach opportunities to instill the same priority on safety that has been the hallmark of aviation since Wilbur and Orville Wright took to the skies 112 years ago."

Aviation groups are hoping to avoid a repeat of those earlier standoffs in the upcoming FAA funding battle.

http://thehill.com/policy/transportation/264711-feds-tout-year-of-safety-in-aviation

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FAA Sued In Federal Court Over Drone Registration Rules

In a move that may give hope to many model aircraft flyers, the validity of the FAA's new drone registry is under challenge in federal court. The hope for these hobby flyers is that if the challenge is successful, they – including children as young as 13 – won't have to file their names and home addresses in a public database. Many hobby flyers have held off on registering their drones, concerned about the public availability of their information.

The lawsuit challenging the FAA registry was filed in the Court of Appeals for the District of Columbia on December 24 by a model aircraft enthusiast concerned that the registration rules were illegal. That individual is John A. Taylor, a multi-rotor builder and flyer living in Silver Spring, Maryland. An insurance attorney, Mr. Taylor is representing himself. He started flying model aircraft approximately one year ago and has become passionate about the hobby. He expected other hobby groups or drone manufacturers to file suit against the registration rules but when they didn't, he decided to step up himself. Although he plainly admits that he has no aviation or administrative law experience, as a long-time litigator, he says he's up to the challenge.

Mr. Taylor is requesting that the court "issue an order declaring that the [FAA's registration rule] is void" and prohibited by Section 336 of the FAA Modernization and Reform Act of 2012. He alleges that that section specifically prohibits the FAA from promulgating any new rules or regulations regarding model aircraft if they're flown for hobby or recreational purposes.

Somewhat surprisingly, the legal challenge does not come – as many hobbyists expected – from the Academy of Model Aeronautics. The AMA – which represents over 180,000 model aircraft enthusiasts - has asked its members to hold off on registering their drones until the legal deadline of February 19 for drones owned before December 21, 2015. (Those bought on or after that date must be registered before operation.) The registration requirement applies to drones weighing .5 to 55 pounds. The AMA has stated that it believes the FAA's new registration rule violates Section 336.

Mr. Taylor requested an emergency stay of the FAA's registration requirement while the case winds its way through the legal process. That request was denied by the Court of Appeals on December 24, stating that Mr. Taylor " has not satisfied the stringent requirements for a stay pending court review." The case will now proceed according to a schedule issued by the Court, with the next filing deadline January 27. The FAA did not immediately respond to a request for comment.

The AMA declined to comment specifically on the lawsuit but it's executive director, Dave Mathewson, said in an emailed response: "AMA has been clear about our disappointment with the new rule for UAS registration. From the beginning of this process, we have argued that registration makes sense at some threshold and for those operating outside of a community-based organization or for commercial purposes. But for our members who have been flying safely for decades and who already register with AMA, we strongly believe that the new interim rule is unnecessary. That is why our Executive Council unanimously voted to look at all legal and political remedies to relieve and protect our members from regulatory burdens. On a parallel track, we are also discussing with the FAA ways to potentially streamline the registration process for our members."

http://www.forbes.com/sites/johngoglia/2016/01/04/faa-sued-in-federal-court-over-drone-registration-rules/

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DJI introduces geofencing for hobby drones

Top drone manufacturer DJI is introducing a new geofencing system to keep pesky little unmanned aircraft from flying where they don't belong.

The Geospatial Environment Online (GEO) will include an up-to-date database on restricted areas for hobbyist-controlled unmanned aircraft, such as DJI's popular Phantom quadcopter. "For the first time, drone operators will have, at the time of flight, access to live information on temporary flight restrictions due to forest fires, major stadium events, VIP travel, and other changing circumstances," said a DJI news release. "The GEO system will also include for the first time restrictions around locations

such as prisons, power plants and other sensitive areas where drone operations raise non-aviation security concerns."

Interestingly, while geofencing will automatically block a drone's navigation system from flying over sensitive areas, those restrictions can be sometimes overridden. "The drone will by default not fly into or take off in, locations that raise safety or security concerns," DJI said. "However, in order to accommodate the vast variety of authorized applications, the new system will also allow users who have verified DJI accounts to temporarily unlock or self-authorize flights in some of those locations. The unlock function will not be available for sensitive national-security locations such as Washington, D.C. or other prohibited areas."

http://www.c4isrnet.com/story/military-tech/uas/2015/12/31/dji-introduces-geofencing-hobby-drones/78082780/

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PUBLIC SAFETY:

Testing ground for drone flights by insurance adjusters

One of the nation's largest home and auto insurance companies plans to launch a program in Iowa next year using drones to inspect property damage after disasters ranging from fires to floods to tornadoes.

Shawn Broadfield, vice president of innovation & claims at Allstate, says the remote-controlled aircraft are small, maneuverable and can carry high-definition cameras to help survey properties and assess claims.

"Tornadoes are a natural disaster that occur quite frequently out there," Broadfield says. "Damage can be intermittent as well as widespread. Drones can help us assess that damage quickly and cover more of the damaged area, once we're allowed in it."

Iowa averages 46 tornadoes a year but in 2004, the state saw a record number — 120 twisters. Severe storms, which can be common in Iowa, are often accompanied by hail, which can cause damage to shingles, siding, windows and more. Broadfield says a drone could be a very useful tool after a hail storm.

"It provides a level of safety for our adjustors, getting to those hard-to-reach places like steep roof lines and not having to go up on a ladder," Broadfield says. "It gives us a complete picture of the damage. The end result of it all is a quicker claims settlement and getting our customers' lives back to normal."

While the company wants to address customer concerns about privacy and safety, he's hopeful Iowans will accept the use of this promising drone technology as a way to improve service.

"All indications right now are, it's going to be positive," Broadfield says. "I think when you don't have to come out repeatedly to assess damage that you might have missed initially where drones can capture a

more complete picture. It'll speed up the process of payment, speed up the process of restoration for our customers."

Allstate's drone program is in the testing phase. Not every adjustor will have one in the trunk of his car, but soon, he says the small aircraft will be used when there's a need in Iowa and elsewhere.

http://www.radioiowa.com/2015/12/28/iowa-to-be-testing-ground-for-drone-flights-by-insurance-adjusters/

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Russian emergencies minister opens center of unmanned aviation

Russia's emergencies ministry on Sunday opened an unmanned aviation center at the ministry's Moscow region department. The ceremony was attended by Minister Vladimir Puchkov. "The unmanned aviation center will help improve the quality of monitoring and raise the level of crisis response," he said. The minister said drones would be used for aerial surveying to establish precise coordinated of emergency situation, damaged facilities, epicenters of wildfires and man-caused fires. Apart from that, in his words, drones would be used to monitor the flood situation and ice clogging's. "The emergencies ministry is developing unmanned aviation, robotic science, the systems of personnel training," Puchkov said, adding that the Moscow region "is a pioneer in the implementation of all new cutting-edge approaches in the area of ensuring safety of human life and activity." The opening of the unmanned aviation center in the Moscow region was timed to coincide with the ministry's 25th anniversary marked on December 27. "Today, the rescue service performs a wide range of activities to prevent emergency situations, to respond to emergencies to help those affected," he said. "The system of crisis management is being developed." "Currently, the ministry is finalizing documents on its development up till 2030," Puchkov added.

http://tass.ru/en/society/847200

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Drones from Hawaii could help save $1.27 billion in marine damage costs

Drones are sweeping the nation and they could be sweeping the Pacific Ocean for debris. At least that's what Mark Ott, an inventor from Kailua has planned, but first he needs several hundreds of millions of dollars in funding.

Ott is building autonomous unmanned marine-debris sweeping drones for Hawaii. These drones will remove plastic, nets and other floating marine debris from the ocean.

Clear Blue Sea Inc., the new company, will clean oceanic trash gyres, such as the Great Pacific Garbage Patch, which are significantly far away from land and so costly to clean.

Marine debris in the Pacific grey causes about $1.27 billion in damages a year to the fishing, shipping and marine tourism industries, according to Ott.

However, his solution doesn't come cheap and his initial plans involve hundreds of millions of dollars in funding. He has three phases planned for funding. In the first six-month phase he is searching for $400,000 in either federal funding or from a foundation devoted ocean clean-ups. He will then need $10 to $15 million for a full scale, proof of concept drone that is sea trial tested. Finally, he will need several hundreds of million dollars for a full scale drone production facility, recycling plant infrastructure, production of 50 drones and the beginning of the cleanup. He foresees the third and final phase taking place in two and a half years.

"We are talking about the birth of an industry, creating hundreds if not more than a thousand job," Ott said. "Experts will become a part of this from many business sectors. This becomes a bigger issue than just the U.S. government and foundation involvement at some point."

The drones, which Ott has called Flotsam Debris Removal Robots, will be powered by solar panels.

The FDRRs are surface vessels only and will be controlled by a human operator. Bulk freighters will be stationed nearby to collect size-sorted debris from the drones. The freighter will go back to Honolulu and transfer the material to the appropriate center.

http://www.bizjournals.com/pacific/news/2015/12/24/drones-from-hawaii-could-help-save-1-27-billion-in.html

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Drone camera almost takes out a skier on live TV

Another day, another UAV causing headaches. This time around, a falling drone camera almost crashed into Marcel Hirscher, a four-time World Cup skiing champion and Winter Olympics medalist, during a slalom race on Tuesday in Italy. The drone, which was carrying broadcast equipment, hit the snow at full speed while Hirscher was in the middle of his run and, luckily, missed making contact with him by a mere couple of feet.

"This is horrible," he said after the fracas, according to the Associated Press. "This can never happen again. This can be a serious injury." And people wonder why the FAA wants to keep a close eye on consumer drones.

http://www.engadget.com/2015/12/22/drone-camera-almost-crashes-into-skier/

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ROTOR FX Launches Drone-Classifieds.com

LOS ANGELES, Dec. 23, 2015 /PRNewswire/ -- After a year and a half of development Drone-Classifieds new global market portal was activated today and is scheduled for full release on January 1st.

Drone-Classifieds provides a free platform for individuals, new developers and marketers around the world to sell their new or used equipment or their latest unmanned developments making them immediately available to anyone with an internet connected device.

General Manager, Edna Aletky, noted that "for at least the next six months the site will randomly select a winner from each batch of 500 listings created on Drone-Classifieds and give them a cash reward of $100 dollars. A DJI Phantom 3 will also be given to someone out of each 2500 listings created on the site." Winners will be posted on the site as they are selected.

This advance listing portal allows the user virtually unlimited space to present their products including any number of images, video links, technical documents and sales sheets. Drone-Classified is completely searchable by category, keyword or tags and includes an advanced complex search tool to immediately locate specific items out of a million plus listing capacity. Listings are self administered and do not expire until the seller removes them.

Aletky remarked that "all the unlimited listings in airframe, equipment, hardware, parts and accessories categories are provided free of charge." Drone-Classified is concurrently building a large library of support documentation such as equipment manuals along with educational, technical and regulatory documents to serve drone users with one stop on the internet for almost any kind of archival information they might need. It also includes a live event calendar available free to promoters of any unmanned events, seminars, webinars or educational sessions.

Free career listings on Drone-Classifieds also addresses the problem of connecting qualified operators, pilots, observers, payload specialists and other technicians with potential employers. These listings also include unlimited document attachments, video links, images and self-promotional materials.

"Buyers will appreciate the wide range of customizable features available to them such as automatic notification when a new item of interest is posted for sale," Aletky said. Sellers will have full control of their listings and a direct connection to their potential buyers with no middleman to cut into their profits.

http://www.prnewswire.com/news-releases/rotor-fx-launches-drone-classifiedscom-300196775.html

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National Oceanic & Atmospheric Administration Collaborative Center for Unmanned Technologies

Collaborative Center for Unmanned Technologies at Channel Islands National Marine Sanctuary is an operational hub designed to engage in rigorous testing and evaluation of Unmanned Aircraft Systems (UAS), Autonomous Underwater Vehicles (AUV), and Unmanned Surface Vehicles (USV) in their application for Office of National Marine Sanctuaries (ONMS) research and management requirements

and to develop the necessary procedures and protocols for successful operations which can be exported to other National Marine Sanctuaries and throughout NOAA.

Unmanned Systems Demo

Joint Unmanned Systems Demo

http://cisanctuary.org/ccut/images/ceut_joint.jpg

The Collaborative Center successfully tested the integration of two different types of unmanned systems for potential use in research and management of National Marine Sanctuaries.

USV MPA Enforcement

Wave Glider Demo

http://cisanctuary.org/ccut/images/waveglider.jpg

The Collaborative Center for Unmanned Technologies at CINMS executed a joint mission with Liquid Robotics to evaluate the potential of Wave Glider Unmanned Surface Vehicles (USV).

VTOL UAS Acquisition

Lighthouse

http://cisanctuary.org/ccut/images/lighthouse.jpg

The Collaborative Center for Unmanned Technologies took possession and operational control of an upgraded and refurbished microdrones md4-1000 Vertical Takeoff and Landing (VTOL) quad-copter UAS.

http://cisanctuary.org/ccut/

Austin Fire Department Shows Off UAS Team

Austin Fire Department is showing off one of their new tools — aimed at helping keep people safe - their unmanned aerial vehicle, more commonly known as a "drone." Since drones are a popular holiday gift item, they say it's important to know the rules beforehand, and check with the FAA.

The department used them to help after the deadly Memorial Day weekend floods.

But at the same time, they can be dangerous if someone else flies them around emergency scenes.

Firefighter Coitt Kessler says, "Our helicopters cannot make entry into areas where the unmanned aerial systems are operating – where they're flying. It's just too dangerous. That is certainly a problem. We have individuals who are flying these things into emergency scenes that create distractions for us. That

is terribly dangerous. We cannot be distracted. We need to be focused on the people that we're going out to save."

AFD says their drone team has eight personnel, including pilots

Focus on Drone Research in 2016

The FedEx Institute of Technology in 2016 will roll out heavy programming, research and community engagement in drones and other unmanned vehicles as these emerging technologies continue to mature.

FIT, which is housed at the University of Memphis, recently announced funding for 11 research projects centered on robotics, autonomous vehicles and drone research.

As FIT's newly-established manager of innovation and research support, Cody Behles said the goal of the initiative is to uncover multi-sector commercial uses for the technology, dispelling the idea that drones and other unmanned vehicles are only used for military purposes or privacy invasion.

http://www.memphisdailynews.com/Editorial_Images/24541.jpg?maxWidth=800&maxHeight=600

Local company 901Drones has been using drones commercially since January 2015 and is partnered in the FedEx Institute of Technology's new research initiative.

(901Drones)

"Because it's becoming more accessible and cheaper, the context it changing," Behles said.

Currently, the U of M hosts a lending library for students looking to check out drones.

With the FIT research fellows, the projects span five U of M departments in subjects like how drones can enhance human capabilities, contribute to transportation planning and equity in Memphis, and enable environmental monitoring and sampling to support disaster response and protect drinking water.

The U of M also plans to roll out a for-credit course on using drones in journalism.

"Pretty much anything you can measure you can measure with a drone," Behles said, adding that drones can also be used to scan for radioactive activity or monitor crops.

As the national conversation around drones picks up pace, the U of M and its partners are positioning Memphis to be a hub of this emerging technology.

In November, LEDIC Realty Co. announced plans for a drone flight school and small manufacturing facility for its new state-of-the-art headquarters.

Behles said that training programs like LEDIC's are going to be essential as the Federal Aviation Administration is set to tighten a fairly unregulated technology.

In December the FAA announced that all drones, used by hobbyists and professionals, had to be registered by the end of the year.

This is the first drop of regulation in what Behles calls "the wild west of phase of application."

Brandon Turk, owner of 901Drones, expects another wave of regulations as drones were a popular gift this holiday season. As accidents become more common, he anticipates that drone usage will be tighter for hobbyists.

As an FAA-recognized commercial operator, Turk says he ebbs with the regulations but doesn't believe any new rulings would damper his business.

"We knew drones would be a big industry and it's going to take off," Turk said. "We wanted to bring the business to Memphis and keep the business in Memphis."

Since January, 901Drones has worked with clients in drone photography, construction site surveys and plotting hunting grounds. Currently, the company is testing infrared camera designed by Oregon-based FLIR systems.

As a partner in the FIT's new drone initiative, Turk will be aiding in a drone education workshop and commercial drone expo to be held next quarter. He'll also be testing any new drone designs that come out of the initiative.

Turk said he has his eye on Mississippi State University's huge drone division. In May the FAA selected the school as the leading partner in the National Center of Excellence for Unmanned Aircraft Systems, a consortium of 13 universities engaged in drone research.

"Memphis has the ability to match that and grow," Turk said.

Behles said that FedEx Corp. has a vested interest in drones and unmanned vehicles. In addition to the 11 FIT projects, the Memphis-based shipping giant is keeping a couple more logistics projects under wraps.

However, Behles said that drones are sooner to be seen in highway maintenance than large-scale shipping. In New York, drones are already delivering packages to nearby New York homes, but it will be quite some time before the pieces are in place for this technology in Memphis.

"This technology is very new and we're still working out how it fits into the larger context of a lot of different industries whether that's commercial applications or logistics, research or agriculture," Behles said.

UAVs Banned At National Parks

Drones are becoming increasingly ubiquitous, but the rules and regulations on where, when and how they can be used are still hazy at best.

Many drone owners know that they should keep their devices away from airports and downtown Washington, D.C., but they might be surprised to find out that they also can't use them in national parks.

The allure is clear — Big Bend, Yosemite, the Grand Canyon and other national parks can offer spectacular views when filmed from above. But those who try to do it with their drones can face penalties and fines.

Related: Fail to Register Your Drone? You Could Be Hit With $27K Fine

Brian Needle ran into that problem when he attempted to put a camera high above Virginia's Great Falls National Park using his drone.

Needle said the park is "one of the most beautiful places" nearby and he was having a wonderful day capturing that beauty from the sky — until he was abruptly interrupted and fined $70.

National park guidelines say that all types of aircraft are banned from parks "other than at locations designated pursuant to special regulations."

Specific unmanned aircraft regulations were put in place in July 2014, said U.S. National Park Service Director Jon Jarvis. "I needed to sort of draw the line" when drone use spiked, Jarvis said.

The drones are prohibited because their presence can be disturbing, not only to people trying to peacefully enjoy the parks, but also to wildlife. Drones "can interfere with, let's say, nesting birds or wildlife that is, you know, high on the mountain," Jarvis said.

"We had an incident with a drone chasing bighorn sheep and actually separating the adults from the young," Jarvis said.

In another drone mishap, a German national's drone crashed into a lake at Yellowstone National Park, forcing a park diver to fish it out. The man, Andrea Meissner, was fined and banned from the park for a year.

Fines for flying drones in a national park can exceed $1,000. Needle, who said he wasn't aware of the ban when he flew his drone, was fined $70.

Related: FAA Says More Than 45K People Register Drones in First Two Days

Still, Needle said he will be back to the park without a drone because he understands the reasoning behind the rule, and he admits that bringing a drone to Great Falls was "not so smart."

"With the increase in popularity and everybody's getting one ... I can see with you know dozens or hundreds of them out there on a singular day would be a big problem," Needle said.

A Silicon Valley for Drones, in North Dakota

FARGO, N.D. — "California and New York want what we've got," said Shawn Muehler, a 30-year-old Fargo resident, gazing at a horizon of empty fields, silos, windbreak trees and hardly any people. A winged craft traces the air, mapping a field with pinpoint accuracy for his start-up, a drone software company called Botlink. "They like drones, but they've got a steep learning curve ahead."

For years, entrepreneurs have come here to farm and to drill for oil and natural gas. Now a new, tech-savvy generation is grabbing a piece of the growing market for drone technology and officials want to help them do it here, where there is plenty of open space and — unlike in other sparsely populated states — lots of expertise already in place.

Silicon Valley has the big money and know-how, Mr. Muehler and others say, but North Dakota can take unmanned aerial vehicles, as the officials prefer to call drones, from a fast-growing hobby to an industry. And just as Silicon Valley got its start with military contracts, entrepreneurs and cooperative universities, they believe they can do the same with drones.

 "The potential up here is tremendous," said Jack Dalrymple, the state's governor. "It's not about supporting a company or two; it's creating the leading edge of an industry."

North Dakota has spent about $34 million fostering the state's unmanned aerial vehicle business, most notably with a civilian industrial park for drones near Grand Forks Air Force Base. The base, a former Cold War installation, now flies nothing but robot aircraft for the United States military and Customs and Border Protection.

Right now, private sector drones are where personal computers were in the 1970s: a hobbyist technology waiting to become mainstream. The technology research firm Gartner says that, barring regulatory hurdles, the United States drone business could be worth $7 billion in a decade.

Companies are moving fast. Last month, Amazon released a video showing its planned delivery drone, and companies like Google and Facebook are working on big drone projects. DJI, a Chinese company that is the world's largest maker of small drones, was funded last spring at a valuation of $10 billion.

Small drones may bedevil cities with privacy concerns, even landing on the White House lawn, but rural states with farming, oil and rail lines see many practical reasons to put robots in the sky. Infrared imaging can judge crop health. Cameras can spot leaks and cracks in pipelines. Smaller copters can inspect windmill blades. Livestock can be located easily.

Grand Forks Air Force Base, 80 miles north of Fargo, has been an all-drone base since 2013. Big Global Hawk unmanned aerial vehicles, made by Northrop Grumman, fly reconnaissance missions from the Yukon to Venezuela from there.

Customs and Border Protection uses the Grand Forks field to patrol from Seattle to the Great Lakes with slightly smaller Predator drones. Sometimes those pilots take over from their Customs counterparts in Texas, patrolling the Rio Grande from screens 80 miles south of the Canadian border.

Where B-52 bombers stood ready with nuclear bombs in the Cold War, the country's first commercial unmanned aerial vehicle industrial park is under construction. Northrop Grumman and General Atomics, the Predator maker, are taking space to train pilots for international sales of the craft.

Other businessmen are looking at modifying their craft for things like high-altitude surveillance of railroad tracks and pipelines. Involta, an Iowa-based operator of data centers that has already created a windmill inspection business in Grand Forks, is looking at building facilities specialized in collecting aerial information.

A company called Field of View, near the planned site of the industrial park, makes aerial sensing equipment. An outfit called the Unmanned Applications Institute is working with providers away from North Dakota on things like local drone manufacture and warehousing.

Nearby, the University of North Dakota, which already trains many of the nation's commercial pilots and the air traffic controllers of some 18 countries, has 200 students learning to fly drones in a four-year program that started in 2009; 61 students have graduated from it. North Dakota State University, in Fargo, has also started teaching drone courses.

Besides military contracts and educational talent, North Dakota also has high-tech talent. In 1999, Amazon purchased an online seller of tools and home improvement gear in Grand Forks, and the company now develops customer service software there. In 2001, Microsoft paid $1.1 billion for Great Plains Software of Fargo, and it now has an office there.

http://www.nytimes.com/2015/12/26/technology/a-silicon-valley-for-drones-in-north-dakota.html?_r=0

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Commercial UAV Use Rises in Rural Areas

In the last few days, perhaps one million small drones were given as Christmas gifts. Many prototype commercial drones, however, have been flying largely unnoticed for almost a year, and are preparing for a big takeoff of their own.

Last week, The Times reported on a growing drone industry in North Dakota. It is just one of several rural areas where there is concerted activity in commercial drones. Far from Silicon Valley, entrepreneurs are working on drone applications for agriculture, energy, rail and other industries largely in less populated parts of the country.

It makes sense: There is more need for drones in rural areas, and there are fewer costly things that a drone might crash into. The military operations involved with many of these endeavors are also in rural areas.

Much like in the early days of computers in Silicon Valley, the government is an important partner in turning this technology into a commercial industry. In 2014 the Federal Aviation Administration chose six test sites for unmanned aircraft systems, or U.A.S., the officially preferred name for drones. The sites involved were in Alaska, Nevada, New York, North Dakota, Texas and Virginia.

In many cases, the U.A.S. industries draw from local strengths. North Dakota has lots of wind farms, for example, and a Grand Forks company called EdgeData is works on using quad copters for inspecting the windmills for wear. There's also a big U.S. Air Force base in the area that only flies drones, where the state is building a U.A.S. industrial park.

In upstate New York, the military is also flying drones, and local industries have long concentrated in remote sensing technologies like radar.

A few weeks ago, the 174th Attack Wing of the New York Air National Guard had the first approved takeoff and landing of a drone at a commercial airfield, the Syracuse International Airport. The flight of the MQ-9 Reaper was the first step in building out an unmanned air traffic control system for drones, according to local officials.

"The consumer drone industry is growing like crazy, but just as fast there are Department of Defense contractors working on new civilian functions," said Larry Brinker, the executive director of the Northeast U.A.S. Airspace Integration Research Alliance, a group that manages the local test site and lobbies for drone companies. "It's not just about the drones, but building out sensing equipment."

"We envision building out in rural environments where you can build a safety case" for U.A.V. air traffic control, said Anthony Albanese, president of Gryphon Sensors LLC, which makes drone sensing gear. "Eventually it will be urban – you can envison delivery centers on top of buildings in cities."

In Nevada, the focus is less on drones, and more on what they can do for other tech industries. "The drones are sexy, but the value is in data collection," said Thomas Wilczek, an aerospace specialist with the Nevada Governor's Office of Economic Development. "We've got a lot of data centers in Nevada – I want them fed. I'm as happy with a company that has 40 engineers working on data as I am with someone making drones."

One thing all the rural experimentation sites share seems to be contacts from the likes of Amazon, Google and Facebook, all of which have big drone programs. "Everybody talks with the test sites," Mr. Brinker said. "We've got a lot of very good altitude they can play with."

Away from the government facilities, there is lots more experimentation in rural areas, from flying firefighting robots in Reno, Nev., to teams of drone pilots for work and play in Iowa, and a British company called BioCarbon Engineering that hopes to plant 1 billion trees a year in deforested areas by using drones.

"Sure, North Dakota – We're all extending the Internet into space," said Chris Anderson, the founder and chief executive of 3D Robotics, a Berkeley, Calif., drone maker. "We understand data and we can solve problems, but we're not in Iowa, we're not in North Dakota. We don't know what a lot of the problems are for these to solve."

http://bits.blogs.nytimes.com/2015/12/30/filling-the-country-with-drones/?_r=0

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Drones Could Scope Out Martian Real Estate

Here's how we might find a place to call home on the Red Planet

In October, NASA released its plan for getting to Mars. The trip is a long way off (we're talking decades), but the agency says it's gearing up: "Like the Apollo Program, we embark on this journey for all humanity. Unlike Apollo, we will be going to stay."

Easier said than done. Aside from the unbreathable atmosphere and wonky gravity, the radiation on Mars could cause brain damage, cancer, and death.

Our best bet for survival may be to hunker down in the protection of lava tubes—networks of tunnels created billions of years ago by molten rock. We can't send rovers in for recon though. The pits can be 100 meters deep, and the thick walls (and lag time) make real-time radio communication impossible.

Carnegie Mellon University, along with a spinoff called Astrobotic Technology, has set its sights on a more effective scout: an autonomous drone. The team recently won a $125,000 contract from NASA to develop the software. Eventually, they plan to build a robot that can fly and hop through steep passages.

How It Works

High-Speed Autonomy

Programming a robot to fly itself through unexplored caverns is daunting enough, but Astrobotic's navigation and perception algorithms need it to "think" at 20 mph. That requires the drone to have a largely unprecedented degree of decision-making without any human input.

Aerial Mobility

The Martian atmosphere is 100 times thinner than Earth's, making rotors ineffective. Researchers are instead exploring CO2-powered thrusters, which would enable a drone to make the sharp turns necessary in unmapped tunnels.

Recharging System

When the vehicle's thrusters run out of pressurized CO2, it could land and use an onboard isotope generator (or solar panels if it's outside the caves) to power a compressor that pulls fuel from the atmosphere.

Ground Game

The drone could catapult through Mars' low gravity (about 38 percent of Earth's) using a spring-loaded strut. Hopping would allow it to cover terrain too rough for wheels or treads, without consuming as much fuel as flight.

Roving Base Camp

Astrobotic plans to have rovers that act as rolling motherships for planetary drones—storing them during long treks, launching them at the mouth of promising caves, and transmitting the data they collect back to NASA.

This article was originally published in the December 2015 issue of Popular Science, under the title, "Drones To Scope Out Martian Real Estate."

http://www.popsci.com/drones-to-scope-out-martian-real-estate

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SENSORS/APPLICATIONS:

3D Imaging About To Get 1,000 Better - MIT

Researchers at MIT Media Lab have demonstrated a method of exploiting light polarization – the phenomenon behind the polarized glasses used for 3D films – to increase the resolution of 3D imaging by as much as 1,000 times.

The method could enable high quality 3D cameras being built in to mobile phone, as well as quickly scanning an object to produce a 3D printed replica.

Polarization not only affects the way in which light reflects from physical objects, the polarization of light carries useful information about the geometry of the objects themselves. To extract this useful information, the researchers employed a Graphics Processing Unit of a Microsoft Kinect.

With a regular polarizing lens placed in front of the Kinect camera, the researchers took three photos of the object, rotating the lens each time. The algorithm then extracted the depth of field information from the Kinect system, and compared light intensities in each of the photos. When the researchers added their system, the Kinect, which can already resolve features as small as a centimeter across from a distance of several meters, was able to resolve features the size of tens of micrometers – a thousandth of the size.

The new system could also have benefits for self-driving cars. While their on-board systems are great in clear weather, fog or rain can seriously interfere with their visual algorithms. This is due the water particles in the air scattering light in unpredictable ways.

In several simple tests, the researchers showed that their system can use information contained in interfering wave patterns to handle scattering. "Mitigating scattering in controlled scenes is a small step," Kadambi says. "But that's something that I think will be a cool open problem."

Meet the Flying, Swimming Drone

Epic cliff-diving fish selfie clips are imminent.

It had to happen, right? Once we conquered the skies with our now-ubiquitous unmanned vehicles, the obvious next step was to send them plummeting beneath the waves as well. But how far away must the one drone that can do it all be? The king of air and sea, perfect for voyeurs or extreme sports bros who don't want to be limited to just the sky? Not far at all, if this prototype from Rutgers University is any indicator.

Dubbed the Naviator, this next-level footage machine is already garnering not just press but heavy interest from the defense industry, for obvious reasons. Pretty soon all those NYC skyscraper-scaling wingsuit dudes who risk it all for Internet fame are gonna have to really step up their game. Watch the video above for more information and a demonstration of the Naviator doing its thing.

No word yet as to when Amazon plans to start delivering to the sea floor.

Scientist's variable vectoring technique for propeller powered unmanned aerial vehicles

The unmanned aerial vehicles (UAV) designed for plateau missions are usually installed with high span chord ratio wings, which provides more lifting force at a relatively low airspeed. The UAVs employ high span chord ratio wings, however, tend to lose their maneuverability. Hence, they usually need larger turning radius and unable to maintain the altitude during sharp slope turning as the lifting force produced by the wings decrease dramatically when the bank angle is large. The discarding of the flight performances may risk the safety of the flight in plateau mountain regions. Variable thrust direction (VTD) technology is a type of thrust vectoring control (TVC) approach that allows to manipulate the directions of thrust to the fuselage of the aircraft.

Most of the existing works are designed for jet engines, which cannot be applied to the conventional propeller engine aircraft. In a paper published in SCIENCE CHINA Information Sciences recently, researchers develop a novel VTD mechanism to the conventional propeller engine UAV, which allows redirecting parts portion of the thrust from the propeller engine to other directions rather than normal axial direction. A combination flight controller for the VTD enhanced UAV is then proposed to coordinate the VTD controlled forces and aerodynamic surfaces forces.

By the introduction of the VTD capability to the conventional propeller UAV, the maneuverability of the UAV has been greatly enhanced, since the VTD engine enables direct force control of the aircraft. The newly developed VTD UAV was applied to implement plateau missions, which demonstrates the usefulness of the proposed technique.

http://www.sciencecodex.com/scientists_variable_vectoring_technique_for_propeller_powered_unmanned_aerial_vehicles-172584

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Disney Research creates drone car that can climb walls

If you've ever piloted a remote-controlled car, you're familiar with the question we all ask ourselves after a couple of minutes of zooming around over horizontal surfaces: "Why can't this thing climb straight up a vertical wall and scoot around like a fly or a gecko or some sort of tree frog?"

In the age of consumer quad-copters, it's perhaps not all that surprising to see a small device that can scale a wall, and in fact VertiGo achieves its trick in much the same way as your standard flying drone (no, unfortunately it is not covered in the tiny sticky bristles of a lizard foot).

In addition to the four wheels (the front pair of which enables the device to steer), VertiGo uses the thrust from a pair of tiltable propellers not to lift itself into the air but to press itself against a surface and evade the downward pull of gravity. Vertigo's propellers flip and angle themselves to allow a transition from ground to wall, and also let the machine sit still on a vertical plane or zip across bumpy surfaces and masonry.

An on-board computer crunches data from an inertial measurement unit and infra-red sensors to determine the VertiGo's position in space and calculate the necessary thrust amount and direction.

Of course all the propelling, oscillation and processing uses energy, and for that reason the VertiGo likely shares the same key weakness of consumer drones: battery longevity. More battery means more weight, which in turn requires more thrust and so greater power usage.

More useful applications for the technology might include military and emergency use, or for scouting out areas too dangerous for people to climb.

http://www.smh.com.au/technology/technology-news/disney-research-creates-drone-car-that-can-climb-walls-20151230-glx6dd.html

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Taiwanese technology research team finds a way to fly Drone with Apple Watch

A Taiwanese technology research team has found a way to pilot drones and manipulate light using gestures from an Apple Watch, which could mean a realistic future for The Force not on the "Star Wars" movie screen, but in the palm of your hand. Joel Flynn reports.

"Previously we've needed complicated controls to fly drones, but now we can use a wearable device, and through human behaviour and gestures directly interact with them - using a hand to control and fly drones directly," said Ven, Co-founder of PVD+.

Ven and his team at PVD+ have written an algorithm for the Apple Watch that allows it to understand and interpret hand gestures.

By moving his hands forwards or backwards, Ven can control the pitch and tilt of his Parrot ARDrone.

PVD+'s algorithm allows users to change the color of a smart light bulb by drawing letters in the air. Photo: Reuters

"When I clap twice the light turns on, as it detects that I'm clapping. When I write an English "R" in the air the red light turns on, and when I write an English "Y" the yellow light turns on. Lastly, when I clap twice the light turns off."

PVD+ aren't the only company developing technology that responds to gestures and hand movements.

What this development makes clear, though, is that The Force might soon be stronger in all of us than we ever thought possible.

http://www.ibtimes.com/video-using-force-no-its-apple-watch-flying-drone-2245938

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Qualcomm sneak peek on chip for drones with autonomous navigation

We've known about Qualcomm's drone ambitions for a few months now, but it looks like the company is ready to demo the goods. Ahead of CES next week, the chip-maker teased features of its Snapdragon

Flight drone platform. If you'll recall, Qualcomm is aiming to do for drones what its done for phones. And that starts with putting camera and communications tech on the same board. Perhaps most notably, Snapdragon Flight offers and autonomous navigation mode. This means when you're done filming, you can push a button and the UAV will return to the launch pad, avoiding any objects that block its path.

https://www.youtube.com/watch?v=_D96TWllOUg#action=share

The platform also offers an optical flow camera, obstacle mapping, visual inertial odometry and motion planning. Based on the Snapdragon 801 processor, Flight handles 4K video in addition to those bells and whistles with Qualcomm's "Quick Charge" tech on board as well. The system is powered by a 2.26Ghz quad-core processor and Adreno 330 GPU and is expected to arrive early this year on Yuneec's drones first. Of course, we'll get to see it for ourselves in Vegas, and we'll be sure to let you know how it performs.

http://www.engadget.com/2015/12/31/qualcomm-snapdragon-flight-drone-chip/

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Evolutionary View Planning for Optimized UAV Terrain Modeling in a Simulated Environment

Abstract

This work demonstrates the use of genetic algorithms in optimized view planning for 3D reconstruction applications using small unmanned aerial vehicles (UAVs). The quality of UAV site models is currently highly dependent on manual pilot operations or grid-based automation solutions. When applied to 3D structures, these approaches can result in gaps in the total coverage or inconsistency in final model resolution. Genetic algorithms can effectively explore the search space to locate image positions that produce high quality models in terms of coverage and accuracy. A fitness function is defined, and optimization parameters are selected through semi-exhaustive search. A novel simulation environment for evaluating view plans is demonstrated using terrain generation software. The view planning algorithm is tested in two separate simulation cases: a water drainage structure and a reservoir levee, as representative samples of infrastructure monitoring. The optimized flight plan is compared against three alternate flight plans in each case. The optimized view plan is found to yield terrain models with up to 43% greater accuracy than a standard grid flight pattern, while maintaining comparable coverage and completeness.

http://www.mdpi.com/2072-4292/8/1/26

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COUNTER UAS:

Russian Air Defense System can destroy enemy aircraft, drones, and UAVs

Air defenses are often the only thing standing between enemy aircraft and their targets, but up til now, it's pretty relatively easy to destroy them. That's because even mobile air defenses typically must stop in order to shoot, making the job easier for aircraft dedicated to knocking them now.

Not anymore. Russia's Tor-M2U system is a 35-ton tracked armored vehicle with a crew of three. Equipped with a radar and up to eight missiles, Tor can destroy enemy aircraft, drones, and unmanned aerial vehicles at ranges of up to 12 miles. And now Tor can also now engage targets on the move.

As the video below shows, Tor can now keep up with Russian ground forces on the offensive, protecting armored columns and headquarters from air attack. That also means that Tor may last just a little bit longer on the battlefield as it plays a game of cat and mouse with enemy air forces above.

http://www.popularmechanics.com/military/weapons/a18776/russian-air-defense-system-shoots-while-it-scoots/

DHS: Drug Traffickers are Spoofing Border Drones

The US Department of Homeland Security has turned to using small drones to monitor its borders, but drug traffickers have apparently already found a way to avoid surveillance.

Timothy Bennett, a Department of Homeland Security program manager, said last week that drug smugglers are using technology to spoof and jam unmanned aircraft systems that are being used at the border.

"The bad guys on the border have lots of money and what they are putting money into is into spoofing and jamming GPSsystems. We're funding some advances so we can counter this," said Timothy Bennett, a science-and-technology program manager at the Department of Homeland Security, which oversees CBP. Those bad guys aren't ISIS, just traffickers, Bennett said on Dec. 16 at the Center for Strategic & International Studies. "It's more about trafficking drugs and people," he told Defense One. "We know who's over there. We can guess who's doing it."Bennett said CBP has a rapid and growing need, especially for "small" unmanned aerial vehicles, or UAVs. But unlike larger drones designed to military specifications, many small UAVs are far more vulnerable to hacking and location spoofing. Consider how easily Chinese cybersecurity researchers Lin Huang and Qing Yang with Qihoo 360 were able to disrupt the geofence on a DJI Phantom drone by spoofing GPS, which is illegal in the United States."The manufactures know it's an issue. They're not going to advertise it as an issue. It becomes cost-prohibitive. They're not going to, all of a sudden, put it in their aircraft because it does drive the price up," Michael Buscher, CEO of Vanguard Defense Industries.

Vanguard makes a drone called the ShadowHawk, a popular purchase among local police forces near the border. Buscher couldn't say how many CPB units or border law enforcement agencies do use the drones, citing non-disclosure agreements, but it was among the first UAVs to be approved for purchase with DHS grant funds, including in border areas.

The ShadowHawk uses military-grade encryption and changesGPS frequencies every half second, according to Buscher. Other drone makers looking to sell to DHS have approached him to ask about hardening their aircraft against attacks. "We've been contacted and they ask us what kind of military-grade encryption that we use. We tell them what the cost is and where we are purchasing it from and then it becomes cost-prohibitive for them," he said.

"It's the spoofing that's bad. That we've got to look into. They can make you think you are someone else," Bennett said. "For small [UAVs], it's a bigger deal. They can't do the secure GPS. There are a lot of anti-jamming systems right now that can detect it but they're big and heavy. So you've got something that weighs 25 pounds, you add five pounds, and it affects its payload or it affects its duration. So the big thing now is getting that [detection] capability on these small ones in a way that doesn't add weight to it."

DHS was unable to say just how often smugglers tried to jam or spoof border-watching UAVs. But Bennett said the attacks are hindering law enforcement abilities to map drug routes. "You're out there looking, trying to find out this path [they're] going through with drugs, and we can't get good coordinate systems on it because we're getting spoofed. That screws up the whole thing. We got to fix that problem," he said.

Debugging DHS Drones

Spoofing is far from the only problem facing Department of Homeland Security and the way it gets drones to the border. In addition to giving grants to law enforcement agencies to purchase UAVs, DHS also has many of its own. Last year, the department's own inspector general declared that DHS drone purchasing program, which had spent $360 million since 2005 — $62 million in 2013 alone — was largely a failure.

DHS had taken delivery of 11 MQ-9 Reaper drones, unarmed but otherwise similar to the ones used by the military in Iraq and Afghanistan. DHS anticipated that the cost per flight hour would be $2,468, far lower than the actual $12,225. The agency was using accounting tricks to move the costs of pilots, equipment, and overhead off the books. Even the actual flights hours — 5,102 — were a fraction of the promised 23,296. As a result, large areas and portions of the border were left undefended. More damning, CBP had little to show for the big price tag. UAVs helped in just 2 percent of apprehensions on the southwest border. The audit came out just as DHS was asking Congress to give it $443 million for another 14 Reapers, also called Predator Bs, which the agency received.

Today, the drone grants that DHS is awarding to law enforcement agencies, while smaller than the Reaper, aren't large to enough to buy the sorts of UAVs that can withstand penetration and spoofing attempts. "We'll have departments call us and say, 'Hey, we got a DHS grant for a drone: $25,000.' [But] our cost starts at $120,000 just for the cameras. The grants that [DHS] is providing, it's setting them up for failure … what they can purchase with it is susceptible … limited in range and capability."

Bennett didn't discuss the report but did lay out a number of steps that DHS was undertaking to improve the way border guards use drones. The agency has launched a project called Robotic Aircraft for Public

Safety II, or RAPS II, to get more small drones to border agents. (The first RAPS, launched in 2012, explored the use of small drones for first responders.) The initial RAPS II demonstration session is scheduled for Jan. 11 at Oklahoma's Fort Sill, where more than a dozen companies will meet to test 20 small drones in day and night conditions.

DHS is also interested in drones that can hover far longer than even the most advanced and fuel-efficient military UAVs. "Other next-generation unmanned systems will conduct a broad range of missions with application to the [Homeland Security Environment]. For example, significant experimentation is ongoing in high-altitude, long-endurance (HALE) aircraft that could remain in flight for weeks at a time," reads a DHS report(written almost a year ago but released to the public on Dec. 16).

The report also says that privacy concerns may curtail the use of drones over U.S. soil. "Already we've seen companies selling persistent surveillance, wide area surveillance solutions," Jay Stanley, a senior policy analyst from the American Civil Liberties Union, said at the CSIS event. "Mass surveillance by use of drones is both something very far away but also very near … The technology will move very quickly."

http://www.uasvision.com/2015/12/31/dhs-drug-traffickers-are-spoofing-border-drones/?utm_source=Newsletter&utm_campaign=75474ff106-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_799756aeb7-75474ff106-297540877

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INTERNATIONAL:

Putin Signs Amendments to Russia's Air Code Regulating Usage of UAVs

Russian President Vladimir Putin signed on Wednesday a bill, which amended country's Air Code and created legal framework for usage of unmanned aerial vehicles (UAVs) in Russia, a law published on Russia's legal information website said.

Putin Signs Law on Rules for Federal Security Service's Use of Force

MOSCOW (Sputnik) — The law introduces norms on certification and registration of drones and specifies requirements on the security of their flights. All the drones with maximum take-off weight of 0.55 pounds should be registered.

According to the explanatory note to the law, the bill aims to provide legal basis for usage of UAVs to meet the requirements of different economic sectors and to solve different tasks in the sphere of security and defense.

The law came into force at the end of 90 days after being published.

Poland seeks micro-UAV systems

The Polish Armament Inspectorate has initiated a tender for six microclass unmanned aerial systems (UASs) under the programme name 'Dragonfly' (Wazka).

Each UAS is to be equipped with at least two vertical take-off and landing unmanned aerial vehicles (UAVs) equipped with day and night electro-optic sensors and a portable ground control station.

The micro-UAV's all-up weight is not to exceed 1.6 kg, while its range is to be at least 1,500 m with an endurance of 30 minutes. The UAV's diameter or longest dimension in ready-to-fly configuration is not to exceed 700 mm. A single Wazka UAV system is to be portable by one operator.

COMMENTARY:

Rise of Unmanned Aircraft Raises Questions about the Need for Pilots

With the automation of flight technology, many are questioning the need for pilots in the future.

The F-35 Joint Strike Fighter is one such craft that is so advanced, it makes crewing seem obsolete, according to Popular Science.

In older jets, the crew is needed to perform manual duties like operate radar, monitor a high-speed data link for plane-to-plane communications and texts from ground troops, or sift through data before firing on targets. In the F-35, there are 8 million lines of software code that make most of those duties obsolete.

Combat pilot Capt. Joseph Stenger, among others in the military, sees the plane as the key to America's continued air superiority. However, it may bring about the end of an iconic American profession.

"If another manned fighter comes up, great. If not, that stinks for the next generation," he told Popular Science.

Still, many argue there will always be a need for human pilots.

For now, unmanned aircraft will continue to be operated with the help of pilots.

If the Air Force consists mostly of unmanned aerial vehicles relying on data links, and those links are fried with an electric pulse, then the drone fails.

"Then the bad guy doesn't even need to shoot it down. The effect is the same. They've won the air space," Penney said.

Pilots, on the other hand, have missions, and will follow through to completion.

http://taskandpurpose.com/rise-of-unmanned-aircraft-raises-questions-about-the-need-for-pilots/

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Ship of Terror

Russia's New Underwater Nuclear Drone Should Raise Alarm Bells

From the first days of the atomic age, nuclear weapons have been designed to be aimed at two kinds of targets – military, and cities and industry.

The only time the weapons were used in war, by the United States at Hiroshima and Nagasaki, they were dropped on cities. In the Cold War that followed between the United States and the Soviet Union, the majority of strategic nuclear weapons on intercontinental ballistic missiles were aimed at military targets, known as counterforce, while fewer were pointed at cities and industry. But the city-busting targets loomed large in the public mind and in the deterrence concept known as mutual assured destruction, in which the two superpowers faced each other in a cocked-pistols standoff.

The atomic bomb as a city-buster has always inspired terror. Fortunately, in the past two decades, these massive stockpiles have been radically reduced. So why would anyone want to go back to the era of nuclear fear? That is the question that hangs over the disclosure that Russia has been developing a nuclear-armed, underwater, unmanned drone. The new weapon was revealed when Russian President Vladimir Putin met with military chiefs in Sochi in November and television news footage captured a page being used in the briefing. The Kremlin later said the video showing "Ocean Multipurpose System 'Status-6'" should not have been broadcast, and the video was deleted, but by that time it had gone viral – and global.

The Russian drone now on the drawing board may reflect Mr. Putin's oft-expressed desire to counter the U.S. antiballistic missile system with an asymmetric weapon. If so, this is a particularly dangerous choice. It could expand the threat of nuclear weapons into a whole new area. Unfortunately, there won't be much debate about the drone in Moscow, where the news media and parliament are largely under Mr. Putin's control and little scrutiny exists of his military adventures.

https://www.washingtonpost.com/opinions/russias-ship-of-terror/2015/12/27/b2085ee0-a9bb-11e5-bff5-905b92f5f94b_story.html

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Growing Number of UAS Enthusiasts and Entrepreneurs adds to Safety Concerns

In its Friday evening broadcast, NBC Nightly News (12/25, story 8, 2:40, Roberts) reported that, "By some estimates, up to a million Americans woke up" on Christmas morning "to find a drone under the tree." This surge in new UAV owners, along with the already growing number of close encounters between UAVs and manned aircraft, "has the government worried about crowded skies and close calls with planes, which is why all of those drones are now required to be registered with the FAA." The broadcast focused not on hobbyists, but on the growing space of commercial UAS operation, profiling examples of the commercial applications for UAS that are already being tried out around the country. "Already, the FAA has issued more than 2,100 exemptions for commercial drone use," NBC Nightly News said.

The AP http://mailview.bulletinmedia.com/mailview.aspx?m=2015122801aerostates&r=6833553-9b38&l=002-0f2&t=c (12/24, Gunderson) reported that "thousands of entrepreneurs across the country want to jump into the potentially lucrative, rapidly growing business," the only problem being that, "if they're ready, the Federal Aviation Administration is not." Entrepreneurs wanting to operate UAS for commercial purposes, which is still illegal, must obtain a Section 333 waiver from FAA until "the agency finalizes long awaited regulations." Still, many entrepreneurs are not "waiting" for FAA to grant their permit applications, the article pointed out, and are "already flying to gain experience needed to market [their] services."

The AP http://mailview.bulletinmedia.com/mailview.aspx?m=2015122801aerostates&r=6833553-9b38&l=003-124&t=c (12/26, Kolpack) reports in another story that "The fledgling drone business is awash with commercial operators who don't comply with federal regulations or interpret them the wrong way, according to the CEO of an unmanned aircraft-related company" SmartC2, Stuart Rudolph. The story reports that FAA is currently "receiving more than 100 reports per month about drones flying near manned aircraft; drones and model airplanes are prohibited from flying higher than 400 feet or within 5 miles of an airport."

The Dallas Morning News http://mailview.bulletinmedia.com/mailview.aspx?m=2015122801aerostates&r=6833553-9b38&l=004-406&t=c (12/24) reported with information for potential new UAS operators about the Federal rules for registering their devices, pointing out that "unfriendly fliers could face sky-high fines if they don't register their new toys." FAA's Lynn Lunsford put it this way: "If you buy your child a bicycle, you're going to have a safety conversation. You're going to make sure they ride safely." Similarly, FAA is "trying to instill in people a certain sense of responsibility that comes with operating an unmanned aircraft," Lunsford said.

Writing in his opinion column with the Chicago Tribune http://mailview.bulletinmedia.com/mailview.aspx?m=2015122801aerostates&r=6833553-9b38&l=005-e60&t=c (12/24), Scott Stantis pointed out that, "Airlines are already filing reports of close calls with commercial jets and drones," and, "It's just a matter of time before there is a horrible accident and the feds will come down hard with over-reaching regulations." Stantis hopes this doesn't happen.

The Washington Post
(12/25) local enterprise reporter Michael Rosenwald explained that Twitter featured "tales of aerodynamic woe," as Americans began flying the more than 1 million new drones given as Christmas presents. He featured a number of examples and stated, "It will be a Christmas miracle if nobody gets hurt."

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Florida reaps benefits of commercial drones: National Perspective

More than 700,000 unmanned aircraft systems, also known as drones, are forecast to be sold in 2015. With the holiday shopping season upon us, more people than ever will be accessing this technology, which will cause UAS to have a huge impact on our economy and society in Florida and across the country.

The Association for Unmanned Aerial Vehicles International estimates that in the first decade following UAS integration, Florida could gain 4,800 new jobs and more than $3.8 billion in economic impact. Nationwide, those numbers could jump to 100,000 new jobs and more than $82 billion in economic impact. Under the right regulatory environment, there's no question these numbers could go even higher. But Washington is delayed.

On Sept. 30, the Federal Aviation Administration missed the congressionally mandated deadline for integrating UAS into the national airspace, and it still has yet to finalize a rule for the commercialization of small UAS. Now more than ever, it is important to establish regulations so that this burgeoning market can thrive.

There is strong evidence of a UAS market that is waiting to be unleashed. Right now, the only way businesses can fly UAS for commercial purposes is through a restrictive exemption process. In May 2014, the FAA announced it would grant exemptions for certain low-risk commercial UAS applications. Since then, more than 2,200 businesses, including nearly 100 in Florida, have received permission to fly.

 AUVSI recently examined the first 1,000 approved petitions, and Florida companies were granted the second most in the nation with 97 approvals. Unmanned aircraft are being used for a variety of applications across the Sunshine State, from real estate and aerial photography to construction and disaster relief.

For example, Orlando Aerial Videos specializes in capturing aerial videos for construction projects and real estate. The startup helps its construction clients monitor the progress of ongoing projects by taking biweekly videos. Orlando Aerial Videos received its exemption earlier this year, and hopes to expand its business by using its expertise for the inspection of sensitive infrastructure including oil and gas pipelines, power lines, and wind turbines.

Florida's real-estate agents, in particular, are taking advantage of this technology to capture unique aerial perspectives of their listings. The FAA has granted 45 exemptions to UAS operators in Florida for

real-estate applications, more than any other state. Real estate is also one of the fastest-growing uses of UAS technology nationwide, with more than 350 real-estate businesses approved to fly, according to the National Association of Realtors.

In addition to commercial applications, UAS platforms have advanced scientific research in Florida. The University of Florida Unmanned Aircraft Systems Research Program is an interdisciplinary group of researchers actively working toward the development of small UAS that are both affordable and address scientific questions in natural resources. Imagery from small UAS provides the ability to rapidly locate and assess ground targets in a variety of remote locations. Researchers from Florida's Cooperative Fish and Wildlife Research Unit will now have the opportunity to examine the state's rich and diverse ecosystem like never before.

These applications of UAS in Florida offer a glimpse into the future and the benefits that will come once the commercial market is fully unleashed. However, the current system of case-by-case approvals isn't a long-term solution for the many Florida businesses that want to fly. The FAA needs to finalize its small-UAS rule, which will establish a clear regulatory framework and allow anyone who follows the rule to fly, opening the door to even more commercial uses of this technology.

At the same time, safety is a top priority for the UAS industry. As people buy this technology during the holidays — whether for commercial or recreational purposes — they are encouraged to learn how to operate UAS safely and responsibly. Recently, the FAA announced that it would require consumer UAS users to register their platforms. Under the FAA's proposed small-UAS rule, commercial operators will be required to register their platforms. Extending this requirement to consumer UAS operators will help promote responsibility and safety. The FAA's registration website was launched on Monday.

UAS technology is developing rapidly and the next innovative use may be just around the corner. To continue reaping the economic benefits, we need to do all we can to support the growth and development of this industry, including finalizing the small-UAS rule that will allow this industry to truly take off.

Brian Wynne is the president and CEO of the Association for Unmanned Vehicle Systems International.

http://www.orlandosentinel.com/opinion/os-ed-drones-regulations-faa-122315-20151222-story.html

Researchers Advance Autonomous ISR Technology

Future conflicts will require smart, autonomous unmanned platforms capable of delivering critical information to warfighters at blinding speed, enabling faster, more effective battlefield decisions to win wars and save lives. Researchers at the Johns Hopkins University Applied Physics Laboratory may have been ahead of their time in creating the infrastructure required for autonomous systems to rapidly provide data to warfighters.

A 2012 article in the physics lab's technical digest describes the Organic Persistent Intelligence, Surveillance and Reconnaissance (OPISR) system as a "visionary, game-changing approach to ISR." David Scheidt, a member of the principal professional staff, Research and Exploratory Development Department, Johns Hopkins University Applied Physics Laboratory, served as the OPISR principal investigator and authored the article. He calls the system a "novel combination of distributed image processing, information management and control algorithms that enable real-time, autonomous coordination between ad hoc coalitions of autonomous unmanned vehicles, unattended ground sensors and front-line users."

OPISR is a software and communications subsystem that, when added to an ISR asset such as an unmanned vehicle or unattended sensor, supports the rapid, autonomous movement of information across a tactical force. It provides intelligence directly to the warfighter without requiring that warfighter to personally direct, or even know about, the OPISR assets gathering the information. The system seeks relevant intelligence, pushing key tactical data directly to affected soldiers in real time.

Scheidt also is working with the Navy Science of Autonomy program to improve the reasoning engines for enhanced unmanned system decision making. This summer, the Navy will conduct flight tests involving the next-generation reasoning engine known as the Adaptive Autonomy Controller, the successor to the Autonomy Toolkit. The upcoming demonstrations will improve methods for humans to instruct and interact with autonomous vehicles; allow decision making under diverse, unexpected operating conditions; and add the capability to continue working for long periods in a denied environment, such as when communications are jammed.

In addition, the Office of Naval Research is using the technology to manage radio frequency systems and the platforms they rely on. The idea is for unmanned vehicles to establish communications with a cell tower, for example, in case of interference.

The OPISR has not yet been adopted into a program of record, possibly because it is ahead of its time. "It has been a struggle to adopt autonomous vehicles for the last decade," Scheidt says. "In part, the user community is just starting to catch up. Before you can have groups of vehicles performing as a team to support you, you need to convince people that a single vehicle can be autonomous. We're just starting to get some of the precursor programs ... to the point they're close to being fielded, both in industry and in the military."

Paul Scharre, a Center for a New American Security fellow who is familiar with some of Scheidt's work, agrees. The vision Scheidt presents for a cloud of persistent, on-demand surveillance to support warfighters on the ground is unquestionably the type of surveillance architecture needed for the future, he says. "It's fair to say that the technology is moving quickly, and things that weren't possible five years ago are definitely possible today. I don't see anything in this architecture that looks impossible or requires technology that doesn't exist yet," Scharre says. "There would be some work to do in integrating all of these components, but it's worth pursuing because the payoff is huge."

However, machines can detect targets effectively. "We have target recognition capabilities that are quite mature. If that's what you're looking for, and what you need to trail, track, interact and interdict, then you can field systems now that look for easily identifiable things," he observes.

The decision-making technology for autonomous systems also is fairly mature, Scheidt says. "We can have effective decisions made by cooperative unmanned autonomous vehicles, particularly the air and [naval] surface vehicles, but they've made good headway with the ground [systems] as well," he states.

Ground vehicles have the most obstacles—literally—including other vehicles and tough terrain. "You don't want your autonomous system running into a ditch," Scheidt deadpans. He also notes that Google's car will have to cope with "stupid people" but not enemy forces.

With rudimentary autonomy, the systems require humans to act as supervisors, understanding the context of a situation and assigning certain tasks. "But why you would want to do that [task] is something you don't want the machines thinking about," Scheidt adds.

In addition, the cognitive technology has improved so that unmanned systems armed with OPISR can learn and make decisions on their own. "They are starting to recognize the current situation and adapt the way they make decisions in response," Scheidt reports.

The technology offers multiple benefits. OPISR-enabled unmanned systems could save money by "not having to pay a pilot to babysit" the unmanned vehicle, he says, but that is not the greatest benefit. The more compelling use case is when the mission requires faster-than-human thinking and reaction time. "The more complex a problem is, the longer it takes a human to figure out what is going on. If the time it takes for an analyst to sort out the data ... hurts mission effectiveness, then it pays to have the machine make the decision and act on the fly," Scheidt asserts.

Additionally, warfighters on the ground may need an unmanned system to perform a specific task, but they may not have the time to actually pilot the system. "People running around in Humvee's have better things to do than to try to figure out exactly what path the unmanned vehicle should be on or exactly what the vehicle should do. Rather, they need to—at a very abstract level—task the vehicle and receive useful, actionable intelligence from it. That's really the killer app," Scheidt asserts.

http://www.afcea.org/content/?q=Article-researchers-advance-autonomous-isr-technology

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Letters for my drone

Just a few short months ago, I called them "flying FOD." My opinion regarding the unmanned aircraft now proliferating has since evolved, though as a pilot, I remain concerned about this powerful and potentially dangerous technology falling into the wrong hands. That includes ignorant as well as malicious hands. I don't want to see one on final approach, or just after takeoff, or, worse yet, not see one until I hit it.

I have seen many drones, met many operators, and seen a glimpse of what the future may hold. In September, I attended an unmanned aircraft convention in Las Vegas, where Chris Anderson, CEO of 3D Robotics, one of the leading manufacturers of small UAS, compared the dawn of the drone age to another technological leap forward, the arrival of the Internet.

Quadcopters and similar systems can now carry cameras and other sensors to an altitude that was previously unreachable for the average person. Anderson noted that the cost of aerial photography is now within the means of nearly everyone, that "we have democratized remote sensing." He also predicted that whether we like it or not, "drones will win." They simply have too much going for them, too many unique capabilities, and there is too much demand. Data available so far supports that conclusion.

To be safe, UAS users must be educated. Anderson envisions most of that happening online. And so it has begun: My new FAA drone registration arrived by email with links to the B4UFLY mobile app, a list of basic safety guidelines (fly below 400 feet; don't be reckless or careless; keep your UAS within sight; don't fly near airports, stadiums, or other people; stay away from other aircraft at all times; and don't fly under the influence). There were useful links to follow to various FAA pages, as well as to the Academy of Model Aeronautics (which has indicated to its members that there will be pushback from model aircraft enthusiasts over the new registration requirement).

The registration process for my Phantom 3 took about five minutes, including a brief wait for a confirmation email from the FAA website for small UAS registration. I supplied my name, email, physical address (phone was optional), and credit card number (the $5 fee will be refunded for those who register by Jan. 20), and in return I got a nice, hot, electronic bowl of alphabet soup. My Phantom 3 (along with any other small UAS between 0.55 and 55 pounds that I might buy and fly in the future) is now known to the FAA as FA343L9HT7. Good thing I don't have to spell that out on the air. Pity that I bought the stick-on decal letters at half-inch size. Those letter decal sheets come with just one "3" apiece, so I had to buy two sheets for one Phantom. A sharpie would have probably been a better choice. It only needs to be readable "without tools" by any future law enforcement or other official who collects my broken drone from, say, the steps of the state capitol, or anywhere else it had no business flying.

In the coming months, the FAA will finalize new rules for commercial operation of unmanned aircraft, and that long-awaited rule will almost certainly mandate formal training. Hobbyists may remain free to do what they want below 400 feet agl, and it may remain up to them to self-educate. Time will tell.

Meanwhile, pilots of manned aircraft do have an opportunity to help. We can all brief our drone-flying friends on some of the key points, including the basics of airspace and the value of checklists and standardized safety procedures. The more ambitious among us (myself included) might even work more actively along these lines, organizing an airport open house and inviting the local community to participate, as some have already done.

I have to confess that I have indeed "gone native" to some extent, after getting my hands on a drone of my own. I've thought more than once about Heart of Darkness, both the original novella by Joseph

Conrad and the later movie adaptation, Apocalypse Now. The protagonist, Christopher Marlow, journeys up the Congo River to find a station agent named Kurtz who had gone mad, and who has convinced the natives to worship him.

But the thing about these drones is, they really are aircraft, small though they may be, and while they won't take you for the ride, they demand every bit as much focus and forethought and, yes, skill to operate safely as any other aircraft. So operating them is more rewarding than I had expected, from a pilot's point of view. The metaphorical river has led me to a surprising destination. There is not so much that separates us, the manned from the unmanned aviators, after all.

http://www.aopa.org/News-and-Video/All-News/2015/December/24/Letters-for-my-drone?WT.mc_id=160101epilot&WT.mc_sect=tec

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Finding the UAS Story of the Year

In attempt to provide a look back at some of our biggest, most well-read stories of the year as we exit 2015, I reviewed our article tracking platform. Although we do track the total clicks and click rate of our online stories, we also understand that certain stories and headlines lend themselves to higher read through volumes and faster click rates. At the same time, we also understand that some stories, however important they actually are, will not record high click rates (over time the majority of our stories all earn high read through volumes).

Before I started the review process, I expected to see stories with big-issue themes—FAA, privacy, etc.—to be at the top for story volume and click rates. It turns out (and I have the data to prove it) that the UAS audience is interested in a huge range of topics. Near the top for our 2015 story archives are stories on university's receiving COA's, the state of the small UAV industry and a technical look at sense-and-avoid strategies for large UAVs.

Although I had hoped to pinpoint and highlight trends from our stories for the reader to draw conclusions from, all I can really say is that when it comes to UAS, readers at-all interested in UAS will read just about anything they can get their eyes on. From sUAS firms partnering with data solutions providers to broad feature-length looks at the state of regulations, the UAS universe is making the time to read and collect information and insight on an incredibly wide topical scope.

For next year, I would argue it is safe to assume the same eagerness of the UAS world to consume information on all topics will continue. To ensure our team is on-point with our coverage, I can't tell you every story we have planned just yet (we do have an incredible number of stories already planned, however), but I can tell you where we plan to be. Early in the year you can find us in Texas for the first-ever UAS event in the Lone Star state. We'll also be in New Orleans for the biggest event of the UAS year, AUVSI's Xponential.

Even with our coverage plan already in the works, please don't hesitate to drop us a line or throw out an idea for a story or an event you think we should be at. If you have a great project in the works, let us know. 2016 is going to be the biggest year in UAS history and if you think you and your team should be part of the 2016 story, make sure to get in touch. Until we talk, Happy New Year.

How Drones May Avoid Collisions by Sharing Knowledge – MIT

If the U.S. Federal Aviation Administration allows the widespread use of commercial drones, the skies could soon buzz with swarms of unmanned aerial vehicles–especially in dense urban cores. That means drones will be tasked with autonomously avoiding collisions, as their numbers will be too high to rely on human air-traffic controllers at all times.

The Stanford Intelligent Systems Laboratory is just one team of more than 130 working with NASA to solve how to manage drone traffic. The traffic-management system, which will be under development for the next few years, will help drones communicate with each other and avoid potential collisions.

A recent paper published by Kochenderfer and mechanical engineering graduate student Hao Yi Ong describes a quick decision process the traffic-management system can use to reroute drones and avoid a collision. Their team ran more than a million simulations for conflict situations for anywhere between two and 10 drones. Drones were given varying levels of information about the other drones in the system and then were tested on their response time and how often they ran into conflict.

The Stanford researchers found that drones could make the quickest decisions when they were paired with the closest other drone, and the two solely considered the others behavior. The slowest response occurred when drones considered their own surroundings and then fed their results into a central system that sent decisions back to the entire group. Decision time always increased as more drones entered the simulation, but the system was always able to make a decision on rerouting a drone within 50 milliseconds.

While drones feeding their data into a central decision-making system was the slowest, it was also the safest. Drones were the least likely to encounter conflict when they fed data into a central system. Drones that received location data about other drones and assumed they would stay on the same path were the most likely to encounter conflict.

The Stanford lab also works with autonomous cars and air-traffic control for conventional planes. One of its breakthroughs involved using a small amount of computing power to decide how a plane should avoid a collision. Traditionally, collision avoidance has been guided by thousands of pages of documents that detail every possible scenario and how to react. The Stanford lab's solution is currently being standardized for use on all large aircraft.

NASA plans to spend 2016 testing the drone-traffic-management systems it has developed thus far at the drone test sites set up across the U.S. by the FAA. Back in November, a NASA team flew a drone at Moffett Field in California while simulating conflicts with drones generated on a computer, triggering an early version of the traffic-management system to alert the drones about the potential collisions. The FAA also tested similar systems developed by drone software and services company Precision Hawk (see "FAA Will Test Drones' Ability to Steer Themselves Out of Trouble").

"To allow large-scale UAS [unmanned aircraft systems] with a mix of beyond visual line of sight and within visual line of sight, we need a system that consists of technologies to manage airspace and capabilities on the UAS itself, rules of the airspace, and procedures for managing contingencies and emergencies," says Parimal Kopardekar, who leads NASA's drone-traffic-control program.

"This is one of the most exciting areas of aerospace right now—the use of drones," Kochenderfer says. "Many of the applications they enable can lead to new economic models, but the potential for saving lives and improving efficiency, I think that's really quite interesting."

http://www.technologyreview.com/news/545046/how-drones-may-avoid-collisions-by-sharing-knowledge/

Drone privacy push could stall out

The debate over drones and privacy is just one facet of a broader policy battle surrounding the future of the unmanned craft.

As companies like Amazon and Google forge ahead with plans to develop their own drones, a White House effort to ensure these unmanned vehicles don't spy on consumers is sputtering along — and seems destined to produce weak privacy protections that the government will struggle to enforce.

"I definitely think that a lot of privacy advocates have been discouraged by how the previous two [administration-led] processes have gone," said Alvaro Bedoya, the executive director of Georgetown University Law School's Center for Privacy and Technology. "The fact is that the industry lobbyists who are blocking privacy legislation in Congress are the same industry lobbyists that go and block a reasonable, privacy protective result out of the negotiations."

The debate over drones and privacy is just one facet of a broader policy battle surrounding the future of these small, unmanned craft. It's more than just big technology companies that want to operate drones; consumers are snapping up toys, too. Fearing as many as a million new hobby drones could take flight this holiday season, the Obama administration in December issued new rules that require owners to register their craft.

For now, commercial drones are generally illegal, although the Federal Aviation Administration has offered broad exemptions for a long list of companies, including several movie and television production firms. Still, a growing number of companies have grand drone aspirations: Theme park owners want to

deploy them to find lost children, for example, and farmers see them as a tool to monitor crops for bug infestations. Google and Amazon, meanwhile, both are making well-publicized plans to deliver packages by air.

When they finally take flight, however, these buzzing vehicles may film, photograph or collect other types of information about individual people down below — and that's triggered a vigorous debate about the need to impose checks on the new eyes in the skies.

There's been only scattered congressional interest in drone privacy; Sen. Dianne Feinstein (D-Calif.) in 2014 called for regulation after witnessing what she called a drone outside a window of her home, though one report later indicated it may have been a toy helicopter. Otherwise, few lawmakers have shown a desire to wade into the debate. The FAA, for its part, has shied away from issuing its own privacy regulations, prompting a court challenge from the Electronic Privacy Information Center. That's left it in the hands of the Commerce Department's National Telecommunications and Information Administration, which began an effort to build privacy guidelines by consensus after an order from the president in February.

One key proposal from the Center for Democracy and Technology would ensure that drone operators agree to strong, explicit limits on the sort of data they collect and what they do with it. CDT leans heavily toward ensuring that private homeowners, for example, must provide some sort of consent before a drone can hover overhead and collect data.

On the other side, a proposal from the law firm Hogan Lovells would give drone operators broader latitude to operate everywhere from major public spaces like theme parks to the airspace right above a family's backyard. The firm represents companies with a stake in the debate, but it has declined to name them.

CDT frets that the Hogan Lovells proposal would make it too easy for data gathered by one company's drone to be shared with other, unrelated firms for marketing purposes. The plan opens the door for an insurance agent using a drone to survey a homeowner's storm damage to sell images to health care providers or credit companies, the group says.

"Prime Air is a future delivery service, not a surveillance operation, and we will respect the privacy of every person, with stringent privacy policies accessible to all," an Amazon spokeswoman said in a statement.

Some participants believe they'll overcome their differences in due time. "Everyone in the group really understands the benefits of having these [best practices] for the industry," said Lisa Ellman, who co-chairs the drone practice for Hogan Lovells.

But as discussions continue, with no deadline in sight, the Obama administration's track record looms large. Back in June, groups like the ACLU stormed out of the Commerce Department's yearlong effort to establish privacy rules for facial recognition technology. They charged that tech companies drowned out

the voices of consumer advocates — and they specifically singled out NetChoice for resisting compromise. The effort remains unfinished.

Michael Drobac, a senior adviser to the Small UAV Coalition — whose members include companies like Amazon, Google and drone-maker DJI — said his industry this time around had expressed an "overwhelming willingness" to work with privacy groups. But, he added: "Most often what happens is efforts are thwarted because there's overreach. ... We have some advocates who are suggesting an approach to consumer information that betrays a lack of understanding of the digital economy that we are part of."

Ted Cruz: I idolized Han Solo as a kid

In its opening comments kicking off the privacy talks, the Small UAV Coalition pointed to the memo signed by the president, which called only for "high level best practices" on the data that drones can collect.

That's an important distinction. The administration's previous efforts to forge consensus around privacy rules hinged on companies actually adopting the text of those proposed safeguards and incorporating them into their privacy policies. That way, the Federal Trade Commission could take action in the event a tech company failed to deliver on its promises. The drone process, by contrast, isn't supposed to result in anything binding — meaning the FTC has less of a hook to issue penalties.

Still, privacy groups believe they hold at least one advantage, saying consumer fears, combined with a host of new state and local regulations, have brought companies to the negotiating table.

"The industry does have an incentive to address public concerns," said Harley Geiger, advocacy director and senior counsel for CDT. "This can help do that."

http://www.politico.com/story/2016/01/drone-privacy-amazon-google-217257

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