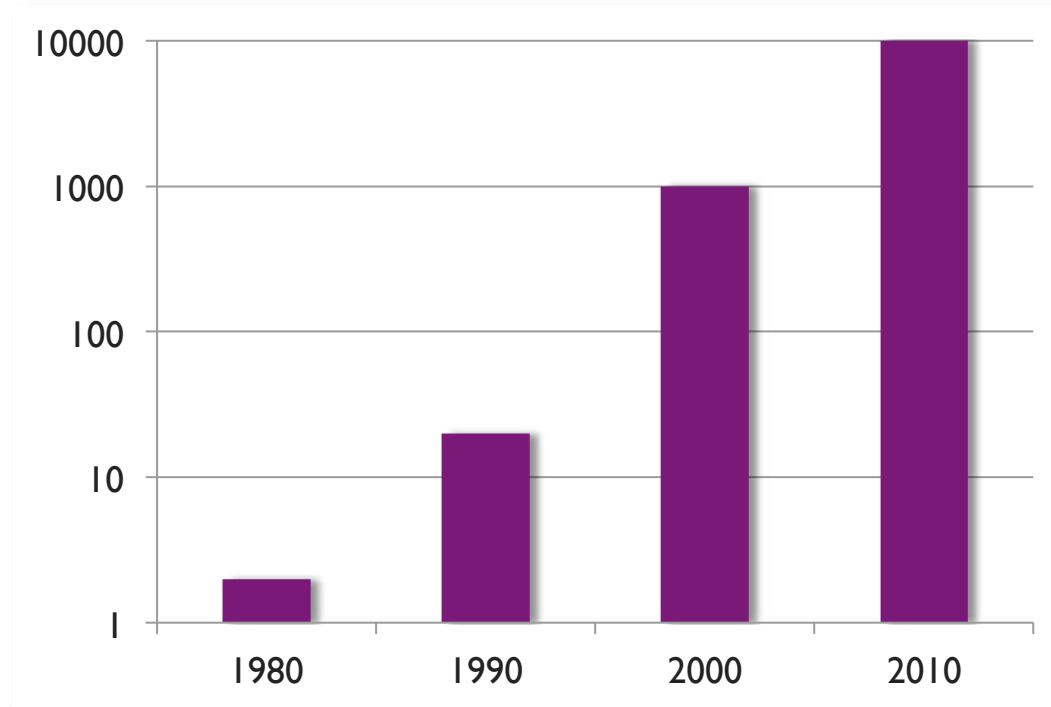


Aerial Robotics



Unmanned Aerial Vehicles in 2010

Number of UAVs worldwide



Predictions of a \$10B industry

- Military: Surveillance, force protection, warfare
- Civilian commercial: Transport, environment
- Civilian private: DIY Drones

FAA predicts 15,000 civilian drones by 2020

Unmanned Aerial Vehicles in 2015



- Over 15,000 drones sold in the US every month
- \$15B industry, projected to grow to \$25B by 2020
- Expectations for leading industry applications
 - ▼ Agriculture
 - ▼ Infrastructure inspection
 - ▼ Border patrols
 - ▼ Photography
 - ▼ Construction
 - ▼ Film production

Unmanned Aerial Vehicles

Remotely Piloted Vehicles (RPVs)



Aerial Robots

Phantom 2 Vision Plus

Maximum flight speed: 33.5 m.p.h.
Maximum ascent speed: 13.4 m.p.h.
Body width: 11.4 in.
Weight: 2.7 lbs.



Drones

Remote Control

Includes a mount for a smartphone and a range extender that allows the phone to communicate with the drone up to 2,300 feet away.



Drones mischaracterize what these things are. They're not dumb. Nor are they unmanned, actually. They're remotely piloted aircraft. - Gen. Norton Schwarz, August 10, 2012



UAVs = RPVs = Aerial Robots = Drones



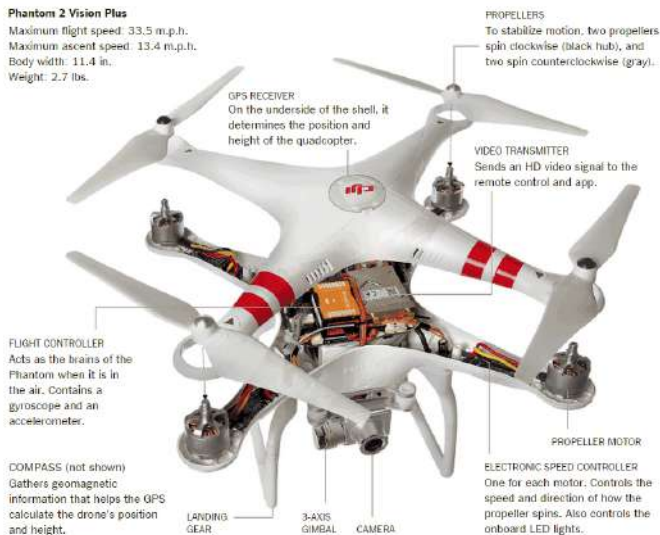
Aerial Robots



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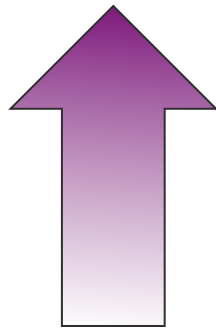
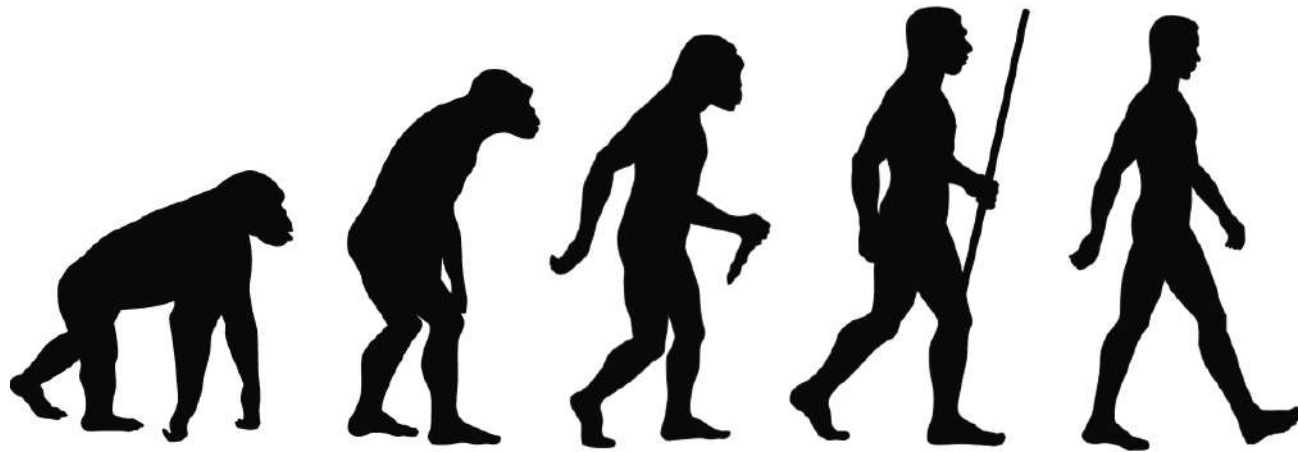
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Aerial Robotics



We are here!

FAA Authorizes Commercial-Drone Testing

Six Operators Selected to Conduct Research, Setting Stage for Eventual Widespread Use

By ANDY PASZTOR

Updated Dec. 30, 2013 7:42 p.m. ET



Officials eventually want to allow widespread use of private drones. Above, an unarmed government Predator. Getty Images

Aviation officials on Monday selected a handful of universities and state agencies to operate sites for drone testing, marking the first time commercial unmanned aircraft entered the U.S. aviation system.

Under the six operators chosen by the Federal Aviation Administration, research will be conducted by industry experts and academics on the safe operation of drones, or unmanned aerial vehicles, across a broad array of geographical areas, climates and types of airspace. The work is expected to target everything from federal certification of the safety of commercial drones to the reliability of air-to-ground communication links to verifying a generation of new, lower-cost sensors designed to avoid midair collisions.

The FAA, however, stopped short of committing itself to a specific timetable for permitting widespread use of unmanned commercial aircraft across U.S. skies.



Currently, law-enforcement agencies, universities and some environmental organizations are allowed to fly remotely piloted aircraft in clearly delineated corridors or swaths of U.S. airspace. The FAA has been facing escalating industry and congressional pressure to move more quickly to open up additional flight regions.

The winning applicants were the commerce department of North Dakota; the state of Nevada; a public airport some 250 miles north of New York City; the University of Alaska; Texas A&M University in Corpus Christi; and a partnership between Virginia Tech and Rutgers University. The first site is expected to begin operating within six months.

For Immediate Release

September 15, 2015

WASHINGTON – As the Papal visit approaches, the U.S. Department of Transportation's Federal Aviation Administration (FAA) is reminding residents of and visitors to Washington, DC, New York, and Philadelphia that these cities and the surrounding communities are No Drone Zones from September 22 through September 27, 2015.

"If you plan to attend any of the Papal visit events, please leave your drone at home," said FAA Administrator Michael Huerta. "Anyone flying a drone within the designated restricted areas may be subject to civil and criminal charges."

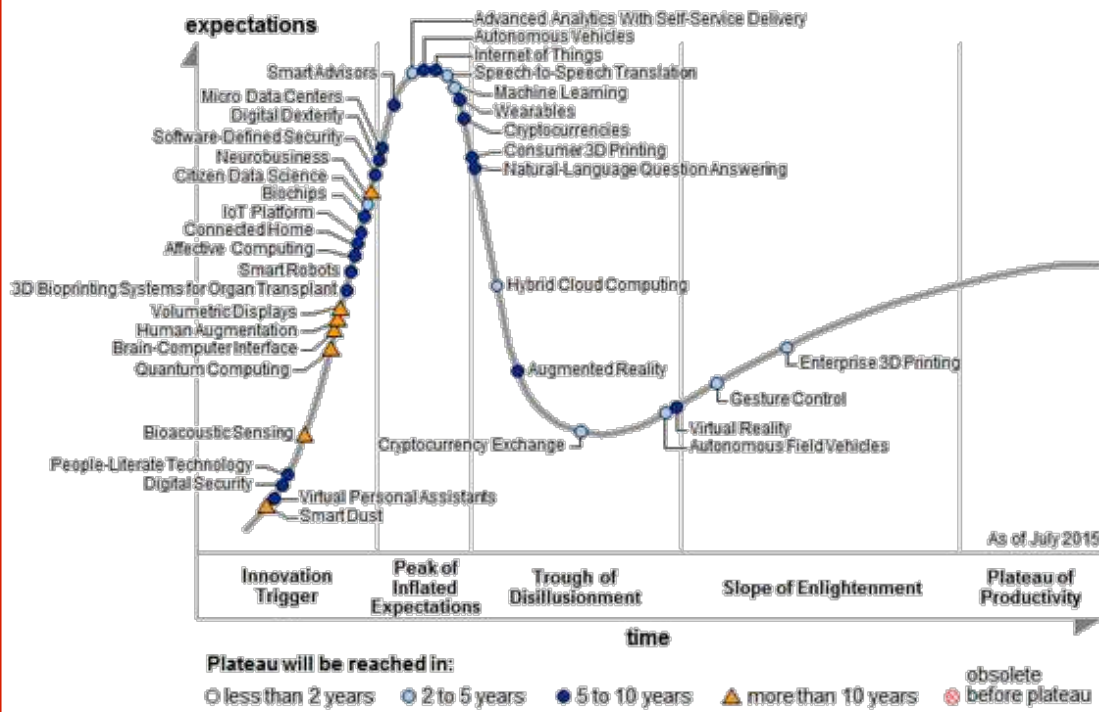
The FAA has flight restrictions in place in and around [Washington, DC](#), [New York](#) and [Philadelphia](#)

([Notice 1](#), [Notice 2](#)). Flying a drone anywhere Pope Francis will visit is against the law. Any unmanned aircraft (UAS) – including radio-controlled model aircraft/UAS – are subject to FAA requirements.



Federal Aviation
Administration

The Skies will be Abuzz with Drones!



Gartner's 2015 Hype Cycle for Emerging Technologies



acquired by



Parrot®



Micro Aerial Vehicles



KMeI kNanoQuad
(0.12 lb)



Hummingbird (1 lb)



AscTec
Pelican
(3.5 lbs)



Boeing
ScanEagle
(20 lbs)



Gen. Atomics
Predator (2,250
lbs)



Gen. Atomics MQ-9
Reaper (10,000 lbs)



Northrop-Grumman
Global Hawk
(32,200 lbs)



Mass

Types of Micro Air Vehicles

- Fixed wing



- Flapping wing

- Insect flight
- Avian flight



- Rotor crafts

- Helicopter
- Ducted fan
- Co-axial
- Quadrotor
- Hexrotor



Quadrotor



Quadrotor

