

# Technological Innovations: Drones

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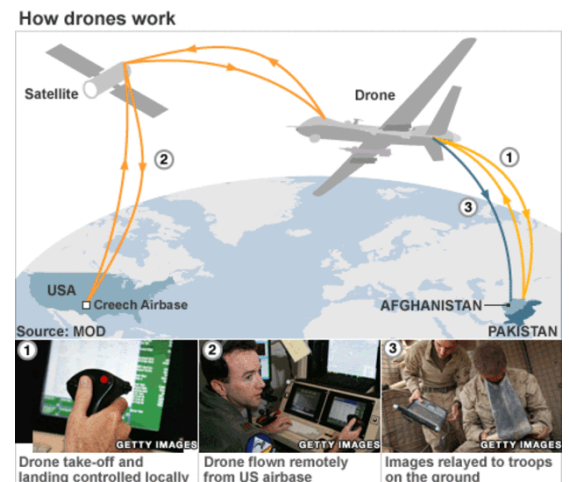


## What is a Drone?

An Unmanned Aerial Vehicle (UAV) is defined as a "powered, aerial vehicle that does not carry a human operator, **uses aerodynamic forces** to provide vehicle lift, can fly autonomously or be



piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload".<sup>[1]</sup> Therefore, **missiles** are not considered UAVs because the vehicle itself is a weapon that is not reused, though it is also unmanned and in some cases remotely guided.



This term emphasizes the importance of elements other than the aircraft. It includes elements such as ground control stations, data links and other support equipment. A similar term is an *unmanned-aircraft vehicle system (UAVS) remotely piloted aerial vehicle (RPAV), remotely piloted aircraft system (RPAS)*. Many similar terms are in use.

These are technologically very advanced Drones which are connected to Satellite.

[https://en.wikipedia.org/wiki/Unmanned\\_aerial\\_vehicle](https://en.wikipedia.org/wiki/Unmanned_aerial_vehicle)

<http://www.bbc.com/news/world-south-asia-10713898>

## Key uses

- Intelligence, surveillance, reconnaissance

- Checking for roadside bombs or devices on landing areas
- Listening to mobile phone conversations
- Helping understand daily routine of locals to see what is normal behaviour
- Close Air Support
- Following or attacking suspected insurgents

## Key drone types

- Two of the medium-sized drones currently in use in Afghanistan and Pakistan are the [MQ-1B Predator](#) and the [MQ-9 Reaper](#).
- These strange-looking planes carry a wealth of sensors in their bulbous noses: colour and black-and-white TV cameras, image intensifiers, radar, infra-red imaging for low-light conditions and lasers for targeting. They can also be armed with laser-guided missiles.
- Each multi-million dollar Predator or Reaper system comprises four aircraft, a ground control station and a satellite link.
- Although drones are unmanned, they are not unpiloted - trained crew at base steer the craft, analyzes the images which the cameras send back and act on what they see.



## History

In 1849 Austria sent unmanned, bomb-filled balloons to attack [Venice](#).<sup>[9]</sup> UAV innovations started in the early 1900s and originally focused on providing practice targets for training military personnel. UAV development continued during [World War I](#), when the [Dayton-Wright Airplane Company](#) invented a pilotless [aerial torpedo](#) that would explode at a preset time.<sup>[10]</sup>

The earliest attempt at a powered UAV was [A. M. Low](#)'s "Aerial Target" in 1916.<sup>[11]</sup> [Nikola Tesla](#) described a fleet of unmanned aerial combat vehicles in 1915.<sup>[12]</sup> Advances followed during and after World War I, including the [Hewitt-Sperry Automatic Airplane](#). The first scaled remote piloted vehicle was developed by film star and [model-airplane](#) enthusiast [Reginald Denny](#) in 1935.<sup>[11]</sup> More emerged during [World War II](#) - used both to train antiaircraft gunners and to fly attack missions. [Nazi Germany](#) produced and used various UAV aircraft during the war. [Jet engines](#) entered service after World War II in vehicles such as the Australian [GAF Jindivik](#), and [Teledyne Ryan Firebee I](#) of 1951, while companies like [Beechcraft](#) offered their [Model 1001](#) for the [U.S. Navy](#) in 1955.<sup>[11]</sup> Nevertheless, they were little more than remote-controlled airplanes until the [Vietnam War](#).

In 1959, the [U.S. Air Force](#), concerned about losing pilots over hostile territory, began planning for the use of unmanned aircraft.<sup>[13]</sup> Planning intensified after the [Soviet](#)

[Unionshot down a U-2](#) in 1960. Within days, a highly [classified](#) UAV program started under the code name of "Red Wagon".<sup>[14]</sup>

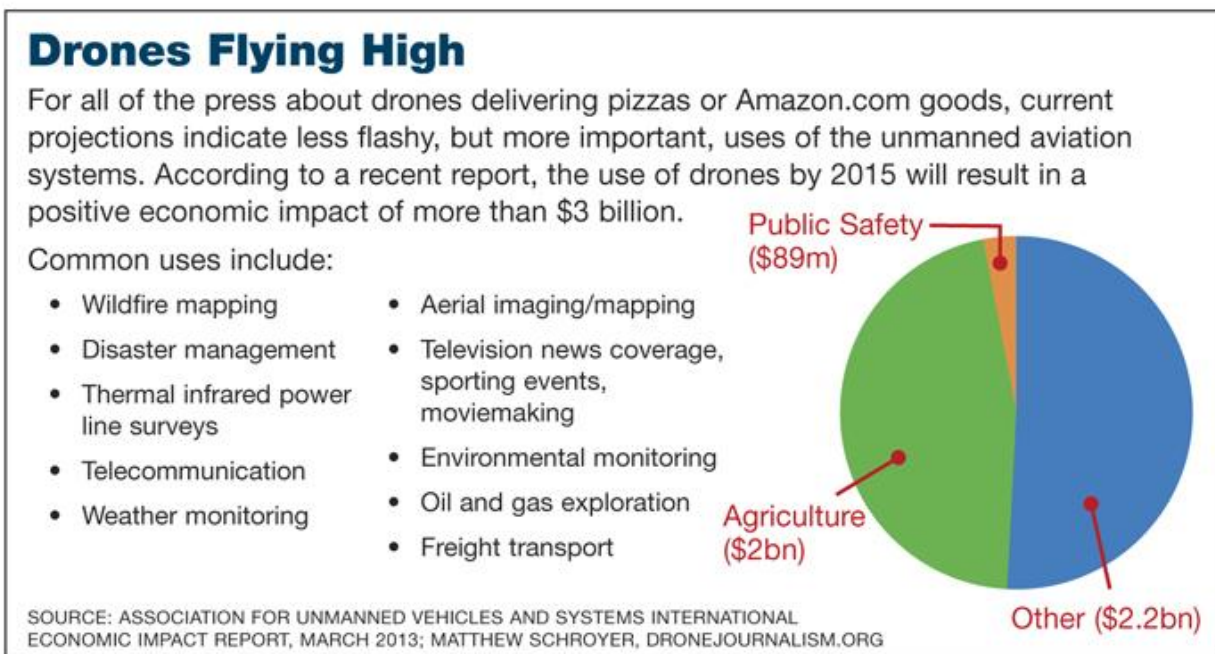
## Drones for other applications

In the United States, the Federal Aviation Administration has been cautious about allowing unpiloted vehicles to zip around. There are numerous safety concerns – they could crash into buildings, interfere with airspace or cause other problems.

In February 2015, however, the FAA [moved to allow limited use of drones](#). The draft rules would keep the aircraft within the operator's line of sight, limit flights to daytime, and also regulate matters such as how the operator is certified.

Should the drones be approved for agricultural use, it has the potential to revolutionize the industry. In [an article for The Conversation](#), drones were mentioned as part of a network of technologies to help out farmers, including GPS, autonomous machines and creating more robust varieties of plants.

Certain companies are also considering sending out drones to do deliveries, which could reduce the cost of using drivers for door-to-door service. Amazon is [advertising a future service called "Prime Air,"](#) which is intended to send deliveries to customers in 30 minutes or less. They have written a letter of application to the FAA for this service.



Drones are sometimes used by government agencies for safety reasons, such as monitoring storms and hurricanes without putting pilots at risk. One example is the [Hurricane and Severe Storm Sentinel](#) (HS3), a five-year test program using unmanned surveillance aircraft called Global Hawks. It's a collaboration among NASA, the National Oceanic and

Atmospheric Administration (NOAA) and Northrop Grumman. Other reported uses of drones have been in applications such as search and rescue and in-air 3-D mapping.

## Drones in Agricultural Use



Drones can provide farmers with three types of detailed views. First, seeing a crop from the air can reveal patterns that expose everything from irrigation problems to soil variation and even pest and fungal infestations that aren't apparent at eye level. Second, airborne cameras can take multispectral images, capturing data from the infrared as well as the visual spectrum, which can be combined to create a view of the crop that highlights differences between healthy and distressed plants in a way that can't be seen with the naked eye. Finally, a drone can survey a crop every week, every day, or even every hour. Combined to create a time-series animation, that imagery can show changes in the crop, revealing trouble spots or opportunities for better crop management.



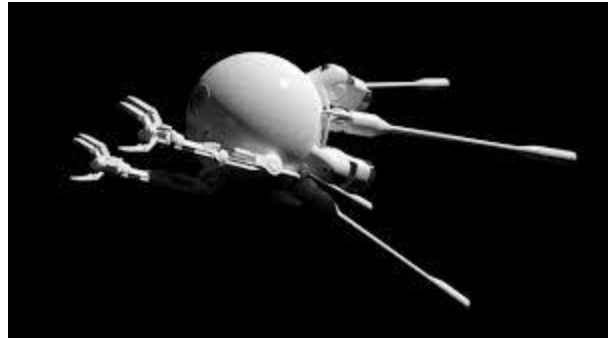
Agricultural drones are becoming a tool like any other consumer device, and we're starting to talk about what we can do with them. Ryan Kunde, a Farmer in San Francisco, wants to irrigate less, use less pesticide, and ultimately produce better wine. More and better data can reduce water use and lower the chemical load in our environment and our food. Seen this way, what started as a military technology may end up better known as a **green-tech tool**, and our kids will grow up used to flying robots buzzing over farms like tiny crop dusters?

<https://www.technologyreview.com/s/526491/agricultural-drones/>



## Drones in space

Perhaps the closest thing to a UAV in space is the X-37B, which looks like a In the United States, the Federal Aviation Administration has been cautious about allowing unpiloted vehicles to zip around. There are numerous safety concerns – they could crash into buildings, interfere with airspace or cause other problems.



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miniature version of NASA's now-retired space shuttle. The unpiloted spacecraft has had three missions and was deployed on a fourth in May 2015.

Most of its work is highly classified, making it difficult to say what it does up there for so long. However, the Air Force has some information available about the fourth mission. In an [e-mail with Space.com in May 2015](#), Air Force spokesperson Capt. Chris Hoyler said the

X-37B would have an experimental propulsion system and an investigation into how well materials perform in space.

"We are excited about our fourth X-37B mission," Randy Walden, director of the Air Force Rapid Capabilities Office, said in a statement in May 2015. "With the demonstrated success of the first three missions, we're able to shift our focus from initial checkouts of the vehicle to testing of experimental payloads."

While not technically called a drone, it could be argued that several of the spacecraft that visit the International Space Station are unmanned aerial vehicles as they carry only cargo on board, with no pilot. There are several of these vehicles, including Russia's Progress spacecraft, the (now-retired) European Space Agency Automated Transfer Vehicles, SpaceX's Dragon and Orbital Science's Cygnus.

From time to time, a space agency will test vehicles in space before putting people on it, which happened in the Mercury, Gemini and Apollo programs. (The space shuttle was never tested without pilots on board.) In 2014, NASA sent its Orion spacecraft high into orbit in an uncrewed test.



## **Use of Drones in India**

Drones are catching up fast at Film Industries, Marriage events and other such places for photography. Its Agricultural uses have not yet known. The Forest Department in Madhya Pradesh has used Drones to track Tiger Movements in Panna National Park, in Kedarnath area to track the trapped victims during the natural calamity and widely in the Indian Army. Open the following links for more information:  
[https://www.youtube.com/watch?v=Bv7b-S\\_aN-0](https://www.youtube.com/watch?v=Bv7b-S_aN-0)

<https://www.youtube.com/watch?v=QCCKbEoIgfW>

<https://www.youtube.com/watch?v=cVHr7cEVqZs>

The DGCA has issues regulatory instructions for use of drones. It will permit civil operations of UAS at or above 200ft above ground level (AGL) in uncontrolled airspace. The Guidelines stipulate that any UAS intended to be operated in India will need to be registered and issued a Unique Identification Number (UIN) by the DGCA. As an indicator of ownership the UAS will need to be affixed with a UIN and a radio frequency ID tag.

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<http://www.lexology.com/library/detail.aspx?g=65f8953c-76c3-417a-b4f1-4dbd443be6de>

## **Conclusion**

Drones are a scientific invention and are expanding its uses from war fields to Agricultural fields, to Space and for various other needs. They are cheaper and have no human life risk involved.

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