

# Drones

*A Reading A-Z Level Z Leveled Book*  
*Word Count: 1,445*

## Connections

### Writing

Research to learn more about how drones are used. Write an essay supporting or opposing their use. Include details from the text and outside sources to support your point of view.

### Social Studies

Research the life and career of Nikola Tesla. Write a report highlighting his major accomplishments and how his contributions have affected modern technology.

LEVELED BOOK • Z

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# Drones



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## Focus Question

What are drones, and how does their use present both benefits and challenges?

## Words to Know

agility	monitor
collide	navigate
customized	remote control
drone	satellite
Federal Aviation	terrain
Administration	unmanned
maneuverability	

Front cover: An aerial drone flies over a mountain lake.

Title page: Young Nepali monks learn the basics of drone flying.

Page 3: A brown bear encounters a drone at a refuge for rescued bears in the Ukraine.

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## Correlation

### LEVEL Z

Fountas & Pinnell	U-V
Reading Recovery	N/A
DRA	50



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Aerial drones with cameras are used for many purposes, such as mapping and land surveying.

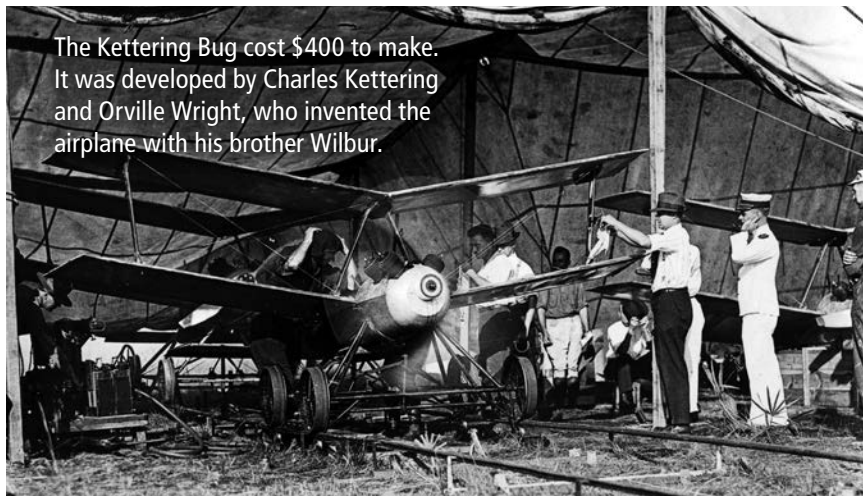
## Introduction

Look up in the sky! That thing buzzing by isn't a bird, plane, or superhero. It's an **unmanned** aerial vehicle (UAV), otherwise known as a **drone**. Once a rare sight, drones are growing in popularity and use. These flying robots can make maps, save lives, and deliver packages lickety-split. And those are only a few things drones can do.

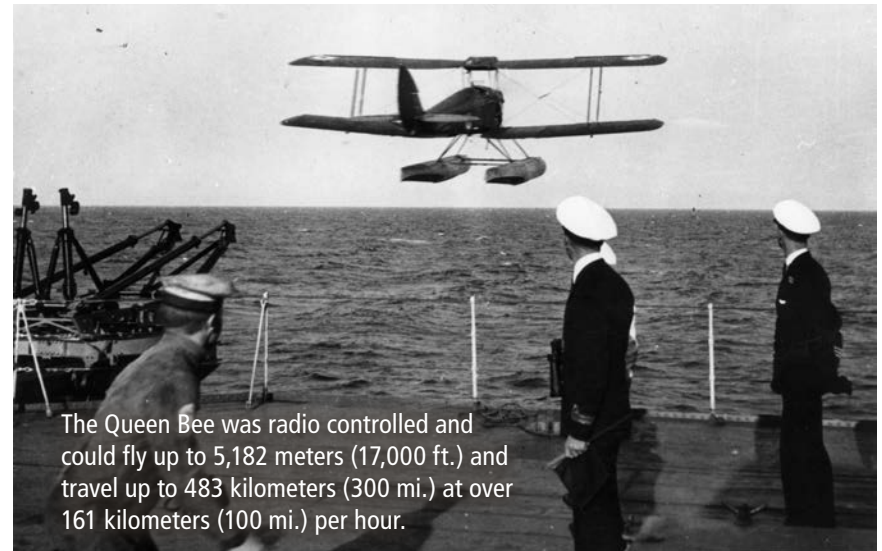


## Piloting from the Ground

Drones may seem like a fairly new invention, but they've actually been around for a lot longer than some might think. The earliest version of a drone was developed by the U.S. military in World War I. The Kettering Bug was designed as an aerial torpedo and was made of papier-mâché and cardboard. More sophisticated drones were developed about twenty years later. They were given the name *unmanned aerial vehicles* because they were not flown by an onboard pilot. Instead, they were flown by **remote control** by someone on the ground or in a "mother" airplane flying nearby. The first UAVs resembled small airplanes and were fairly large. Some were over 6 meters (20 ft.) long and had a wingspan of nearly 9 meters (30 ft.).



The Kettering Bug cost \$400 to make. It was developed by Charles Kettering and Orville Wright, who invented the airplane with his brother Wilbur.



The Queen Bee was radio controlled and could fly up to 5,182 meters (17,000 ft.) and travel up to 483 kilometers (300 mi.) at over 161 kilometers (100 mi.) per hour.

UAVs were developed mainly for target practice by British forces during World War II. The British navy named their prototype UAV the Queen Bee. A United States admiral saw a demonstration of the Queen Bee and wanted something similar for the U.S. Navy. Commander Delmer Fahrney designed the American UAVs, which he nicknamed *drones* to pay homage to Britain's Queen Bee, after which they were modeled. The name stuck, and all U.S. Navy UAVs were thereafter called *target drones*.

## Word Wise

The term *drone* for target UAVs was applicable in more ways than one. A drone is a male worker bee. Also, as a verb, *drone* means to make a prolonged humming sound similar to that made by a UAV as it flies.

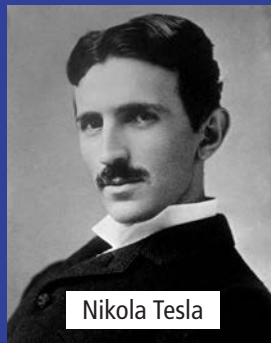
## Early Whirlybirds

Over the next eighty years, drones evolved into smaller flying devices. While early drones resembled miniature planes, newer drones looked more like tiny helicopters. Instead of wings, these drones had spinning blades called *rotors*. Some drones could have six or more whirling rotors carrying them into the air.

The use of rotors greatly improved drones' **maneuverability**. These nimble machines could swerve and change direction quickly. Operators could now send drones to precise locations that used to be hard to reach. They could also fly closer to the ground and hover in one place. Drones' size and **agility** made them well suited to tasks that were difficult or impossible for planes. Drones began to see widespread use beyond the military.

### The Father of Unmanned Technology

The man responsible for the electrical power system we use today was also a key player in the development of drones. Nikola Tesla invented a radio-controlled boat in 1898 and gave a demonstration in New York City. The technology he used was an early version of the same technology that lets people operate drones from a distance.



Nikola Tesla

## Eye in the Sky

Users discovered that drones were ideal for taking bird's-eye-view images. In the past, aerial photographs had usually been taken from airplanes. Planes had to fly well above the ground to avoid obstacles. This made getting close-up images on the ground a challenge.

Drones, on the other hand, could fly much slower and lower. They could buzz along below cloud cover that made it hard for photographers in planes to take clear images. Drones could also **navigate** tight spaces, such as canyons and ravines, that were not accessible to larger aircraft.

Filmmakers saw that drones could make their jobs much easier. Instead of using special effects to show flight, they could attach a camera to a drone and record footage showing what it was like to really fly. Using multiple drones also let filmmakers get shots from overhead angles and perspectives with relative ease—without interfering with actors or putting crew members at risk.

Mapmakers now send drones into remote and difficult **terrain** to get sharp images of what the land is really like. Drones can provide up-to-date photos of changes to glaciers and other evolving landforms.

## Help Is on the Way!

Drones' ability to navigate near rough terrain also makes them ideal for helping rescuers locate people who may be lost or injured. Unlike regular helicopters or search planes, drones can zoom beneath the forest canopy and get a clear view of the area below. Instead of recording video for later viewing, search and rescue drones provide a live stream of images as they travel.

When searching at night, drones use thermal imaging, which detects the warmth given off by a person's body. Drones can drop critical supplies such as water, food, or blankets with pinpoint accuracy and at a much lower cost than helicopters or search planes.

Drones are especially valuable when disaster strikes. Earthquakes and floods often make roads and airports impassable and keep victims from getting the assistance they need. Drones can also **monitor** disasters in progress, such as wildfires or volcanic eruptions. Data can be gathered without putting humans in harm's way.

A 2015 aerial drone photo shows flooding in the streets and homes of Dalgopol, Bulgaria.



A bull elephant encounters a drone in the Moremi Game Reserve, Botswana, Africa.

## Watching Wildlife

Humans aren't the only ones who benefit from drones—animals do, too. Patrolling vast areas such as large ranches requires a lot of time and workers. Drones are a much faster and cheaper way to keep tabs on roaming animals. Drones can find stray cattle and have even been used to herd animals back to where they should be!

Wildlife preserves use drones to keep an eye out for dangers and to monitor animal activity. If an animal is in distress, rangers can quickly get to its exact location, thanks to drone technology.

Drones also provide researchers with a better way to study how animals function in native habitats without disturbing them.

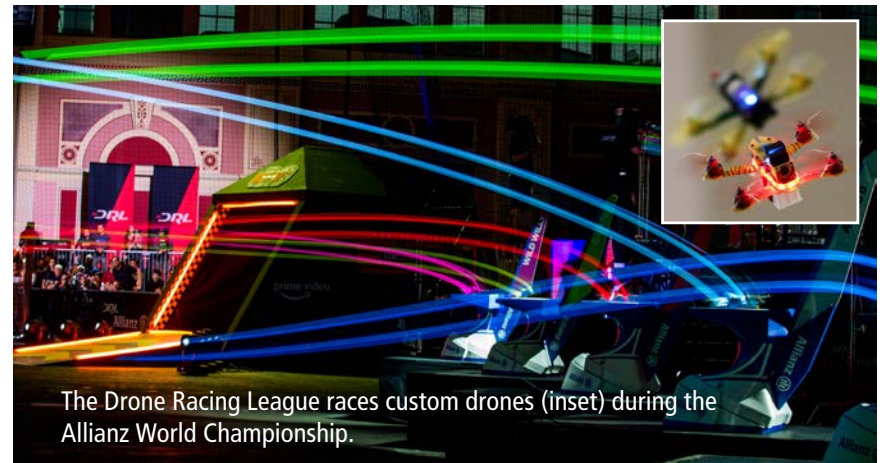


## Special Delivery

Businesses have recently begun exploring ways to use drones for **customized** delivery. Both online retailers and local businesses are seeking ways to bypass ground transportation and deliver small packages directly from their warehouses to buyers via air. It's possible that in the near future, the pizza you order will arrive not by car but by drone!

In remote parts of the world, drone delivery services are being used for sending critical medical supplies. Rural clinics and medical outposts in the African nation of Rwanda, for example, rely on drones to deliver blood needed for emergency surgery or urgent medications. The drones follow a preprogrammed route that is monitored on computer tablets using **satellite** navigation systems. When a drone reaches its destination, it drops its precious cargo and sends it floating by paper parachute to the clinic below. This service has cut the delivery time from hours to minutes, saving countless lives.

A drone delivers emergency medical supplies, in this case blood, in rural Rwanda.



The Drone Racing League races custom drones (inset) during the Allianz World Championship.

## Fun and Games

Drones can be used for serious purposes, but they have more entertaining uses, too. One of the newest is competitive drone racing.

Drone races can offer participants and viewers “an exciting, real-life experience mixed with video-gamelike dynamics,” according to Nicholas Horbaczewski, founder of the Drone Racing League (DRL). Small, illuminated drones fly at nearly 129 kilometers (80 mi.) per hour through an obstacle course set up in a large indoor structure such as an abandoned shopping mall or sports stadium. Pilots on the ground use joysticks to maneuver their drones along the course. Tiny cameras mounted on the drones feed exciting video to headsets worn by pilots. The view makes them feel as though they are riding on the speeding drone.

The league wants the races to be as thrilling as possible. This is why they don't expect pilots to use their own drones. Instead, race organizers provide the drones for each competition and bring a drone "pit crew" to make repairs and keep drones flying. That way, pilots won't have to worry about possibly crashing and ruining a prized piece of equipment.

Many see this new sport as something that will grow in popularity and attract fans who now enjoy car races or video games. Some sports television channels have even broadcast drone race competitions. Drone races are held around the globe. It seems this sport of the future is really taking off!



## Stop Looking at Me!

Safety is not the only drone concern. Privacy is another. Most people don't want a flying robot filming them at home. Some communities have banned drones fitted with smartphones or cameras from flying in residential areas.



## Special Challenges

As drone use increases, it presents new challenges. Regulators are concerned that drones may pose a hazard to conventional fixed-wing aircraft and standard-sized helicopters. Unlike commercial aircraft, drones are not required to file flight plans and do not show up on flight radar. Because drones are so small, they can be hard for pilots to see until it is too late. And since independently operated drones have no way to communicate with each other, they may **collide**.


For these reasons, the **Federal Aviation Administration** (FAA) is working to set guidelines for drone operators. As of 2017, drone operators must be licensed. They must notify airports if they will be flying a drone within 8 kilometers (5 mi.) of an airport. Also, drones cannot be flown near national monuments or over major sporting events where many people gather. A disabled or out-of-control drone could put bystanders in danger.



## Conclusion

Even with the risks, it seems drones are here to stay. Years ago, people looking to the future predicted that humans would rely on robots to do many tasks they could not or did not want to do. That prediction seems to be coming true as “flying robots” assume a larger role in our lives. Drones, combined with other technological advances, present opportunities for making lives better and letting us see the world from a new perspective.

Drones light up the sky during an arts festival in Sydney, Australia.



**Do You Know?**

Drones may someday replace fireworks. Swarms of tiny drones equipped with bright multicolored lights can be programmed to fly in formation and create dazzling displays.

## Glossary

<b>agility</b> ( <i>n.</i> )	the ability to move quickly and easily (p. 7)
<b>collide</b> ( <i>v.</i> )	to crash into something violently or forcefully (p. 14)
<b>customized</b> ( <i>adj.</i> )	changed to be more personalized or to fit special requirements (p. 11)
<b>drone</b> ( <i>n.</i> )	an unmanned aircraft or ship that is operated remotely (p. 4)
<b>Federal Aviation Administration</b> ( <i>n.</i> )	a national agency that controls and manages all aspects of civil aviation in the United States (p. 14)
<b>maneuverability</b> ( <i>n.</i> )	the ability to move or change direction quickly and easily (p. 7)
<b>monitor</b> ( <i>v.</i> )	to observe or check the progress of something over time (p. 9)
<b>navigate</b> ( <i>v.</i> )	to find one's way over a long distance; to steer a course toward a destination (p. 8)
<b>remote control</b> ( <i>n.</i> )	a handheld device that can be used to control something from a distance, such as a TV or a toy (p. 5)
<b>satellite</b> ( <i>n.</i> )	a natural or human-made object that orbits Earth or another object in space (p. 11)
<b>terrain</b> ( <i>n.</i> )	the natural features of a piece of land; ground (p. 8)
<b>unmanned</b> ( <i>adj.</i> )	not carrying or controlled by a human (p. 4)