

Intro to Small Unmanned Aircraft Systems & Recreational Drones





Business and Community Education



Mondays & Thursdays
November 3rd to 12th.



"If you give me a good grade,
I'll give you a good evaluation!"



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AMA Chartered Club #792
Cedar Falls, IA



Class Introduction

- What is your Name?
- Do you own a drone?
- What do you want to get out of this class?
- Anything you want to share with the class?



Class Objectives

By the end of this class, you will know:

How to register as
a Recreational
Drone Pilot with
the FAA

How to pass The
Recreational UAS
Safety Test

Where you can and
cannot fly

The FAA Rules for
drone operation

What you can do
with a drone

What to look for
when buying a
drone

What's on the Part
107 commercial
drone pilot test

FAA Airspace

Drone Photography



**Which ones fit
the FAA
definition of a
Drone?**





What is a Drone?

A drone is an aircraft that operates without a human pilot on board. The FAA refers to these as:

Unmanned Aircraft Systems (UAS), or
small Unmanned Aircraft Systems (sUAS)

which consist of:

- *The unmanned aircraft or drone*
- *A ground-based controller or transmitter*
- *The communication system linking the two*

Drones can function with varying levels of autonomy, ranging from complete remote control by a human operator to fully autonomous operation through an onboard computer.

What is a Drone?

The following terms have also been used to describe drones:

- Quadcopter, Multi-Copter
- Model Aircraft, R/C Aircraft, R/C Airplane, R/C Helicopter
- Remotely Piloted Vehicle (RPV)
- Remotely Piloted Aircraft (RPA)
- Remotely Operated Aircraft (ROA)





Types of Drones

- **Fixed Wing** – airplanes or model airplane
- **Multi-Rotor** – quadcopter or multi-copter
- **Rotary Wing** – helicopter



What can you do with a Drone?

Recreational drone activities

- Aerial Photography – Photos & Videos
 - Scenery & Sunsets
 - Vacation Photos
 - Home Movies
 - Social Media – Facebook, YouTube, WhatsApp, Instagram, TikTok, Snapchat, Pinterest & Reddit
 - Selfies
 - Outdoor Sports – hiking, camping, cycling, canoeing, kayaking, rafting, rock climbing, running, sailing, skiing, sky diving, surfing.
- Fly for Fun
- Technical Challenge
- FPV (First Person View) Flying
- Drone Racing

What can you do with a Drone?

Commercial drone activities

- Education & Research
- Aerial Photography
 - Weddings
 - Video & Movies
 - Sports Filming
- Environmental Studies
 - 3D Mapping & Modeling of Surface Topography
- Real Estate Sales
 - Photographs
 - Land Surveys
- Marketing
 - Aerial Advertising
- Construction
 - Civil Engineering
 - Aerial Inspection of Bridges, Buildings, Windmills
 - Mining Exploration
 - Power Line Inspection
 - Oil & Gas Surveys & Inspections
- Precision Agricultural
 - Seeding & Fertilizer
 - Monitor Crop Conditions
- News & Information

What can you do with a Drone?

Public Safety Activities

Police, Fire & First Responders

Drone as First Responder (DFR)

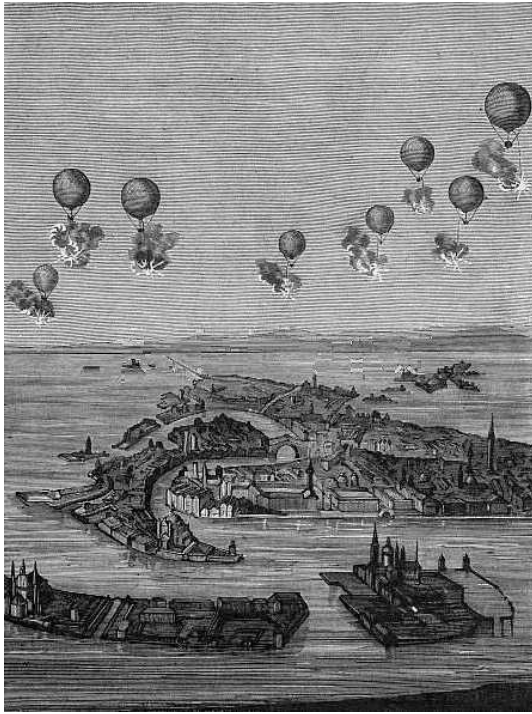
- Search & Rescue
- Thermal Imaging

Real-Time Crime Center (RTCC)

- Surveillance
- Traffic Flow

Government

- Street Mapping
- GIS Surveying (Geographic Information System)



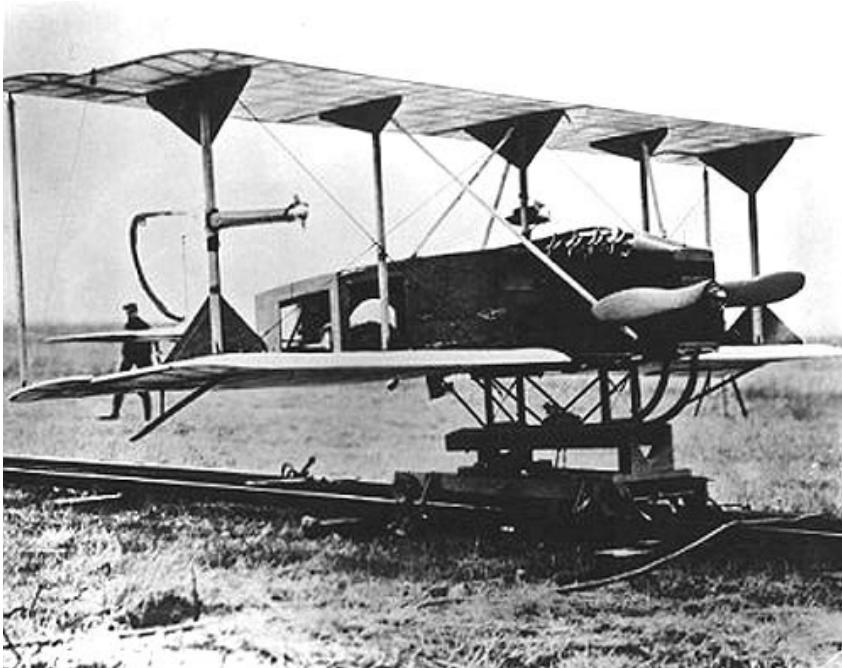
History of Drones

In 1848, the city of Venice revolted against Austrian domination. The Austrians besieged the city by sea. During the siege, they conducted the first recorded air raids in history, using unmanned balloons to drop bombs over Venice.



History of Drones

World War I

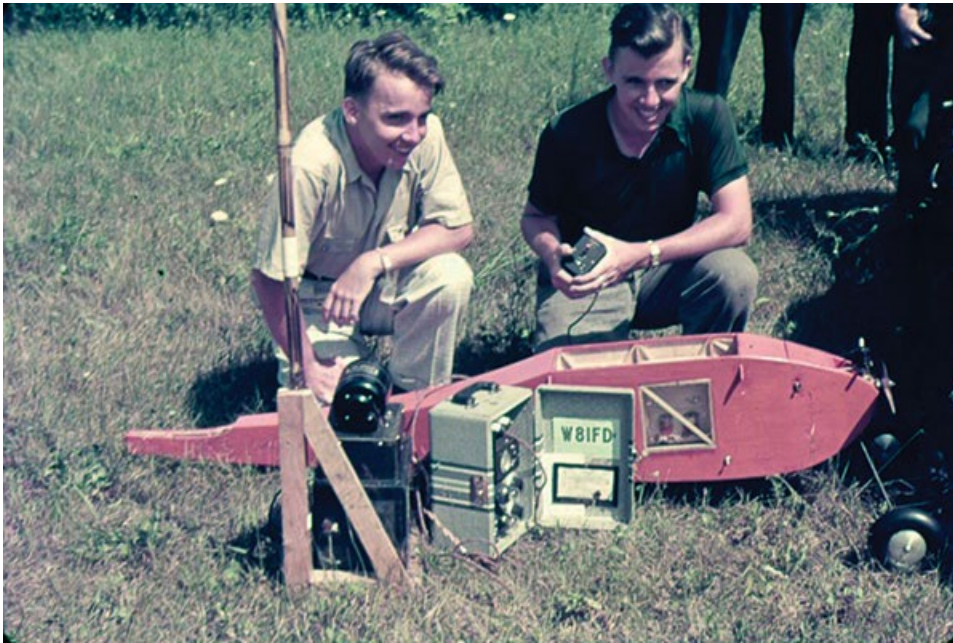


**Hewitt-Sperry
Automatic Airplane**



**Kettering
Bug**

First Radio Controlled Model Aircraft



Walt and Bill Good with the Guff (1938)

Radio Controlled Target Drones



OQ-3 Radioplane Target Drones built during WWII

MQ-1 “Predator” drone



July 1995 – Enters service for the USAF – Cost \$4,030,000



Drone Swarms





The radio controlled Parrot AR Drone was revealed at the International CES 2010 in Las Vegas. Price \$359.

First “Toy” Drone

DJI Phantom I



**2013 – First ready-to-fly Personal Drone – Price \$679
(Camera not included)**



DJI Phantom 4



2016 – AI and integrated camera allowed it to avoid obstacles instead of just following a GPS signal – It could autonomously follow people and animals – Price \$1399

Varities of Drones

Toy Drones – inexpensive

Micro Drones – small size – fly indoors

Hobby or DIY Drones – wide variety in cost and features

Racing Drone – fly fast indoors or outdoors

Photo Drone – high quality camera

Professional & Special Purpose Drones – large, \$2000 and up

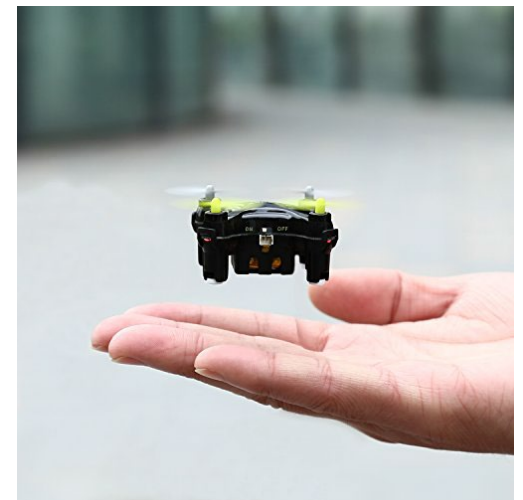
Toy Drones

- Most are sold in retail stores
- \$20 to \$250
- Built in China
- Usually not a “brand name” product
- No service and limited replacement parts
- FAA registration usually not needed



Micro Drones aka “Tiny Whoop”

- FAA registration not required
- 5 Minute Flight Times
- Camera is Optional
- Fly Indoors or in Calm Wind Outside
- Too Light to Cause Damage
- Indoor Racing



Hobby or DIY Drones

- FAA registration usually required
- Buy or 3D Print parts
- Buy motors, controller, batteries & camera
- Only limited by imagination and budget
- Extensive knowledge required
- Must comply with applicable FAA Rules



Racing Drones

- FAA registration required for outdoor racing
- 10 Minute Flight Times
- Includes a Fixed Camera & Goggles – First Person View (FPV)
- Fly in all wind conditions



Photography Drones



- \$1500 & up
- FAA registration required
- 20+ Minute Flight Times
- High-Quality Camera
- Fly Outside on “Breezy Days”
- Advanced Features & GPS

Professional Drones



- Cost – \$3,000 & up
- FAA registration required
- 30+ Minute Flight Times
- Heavy Payloads
- Redundancy with 8 Rotors
- Fly Outside even on windy days
- Advanced Features & Highly Accurate GPS
- May use a Ground Station

Agricultural Drones



Aeroseeder is based at Elmwood Farm in Garnavillo Iowa. U50 model has 14.5-gallon liquid or 77 pounds dry capacity – 40 acres/hour. 80 pounds empty takeoff weight.

Drone, Spreader, 2 Chargers and 5 Batteries is \$25,270

Agricultural Drones



Biosphere is based Dyersville Iowa. DJI Agras T40 model has 14.5-gallon liquid or 88 pounds dry capacity. 110 pounds empty takeoff weight.

Drone, Spreader, 1 Chargers and 1 Battery is \$16,999

*Payloads decrease 7 pounds for every 1000 feet altitude increase.

Personal Transport Drones



Jetson ONE - \$128,000 – 477 units delivered or on order – taking orders for 2027 delivery

Maximum flight time – 20 minutes

Maximum pilot weight – 210 pounds

Personal Transport Drones



SkyDrive (\$1.5M)

Production in 2026

Partnership with Suzuki Motors



Joby Aviation





Consumer Drone Market Today

The market is
rapidly
changing
driven by
technological
and
regulatory
change



Drone Market Today

DJI has about 80% market share in the USA



DJI Consumer Drones

- **Flip**
- **Mini**
- **Air**
- **Mavic**
- **Avata**
- **FPV**
- **Phantom**



DJI Drone Lineup

Camera

- NEO
- Flip
- Mini 3
- Mini 4 Pro
- Air 3S
- Mavic 3 Pro



Immersive flight

- FPV
- Avata
- Avata 2



Commercial

- Enterprise
- Cinematic
- Agriculture
- Delivery

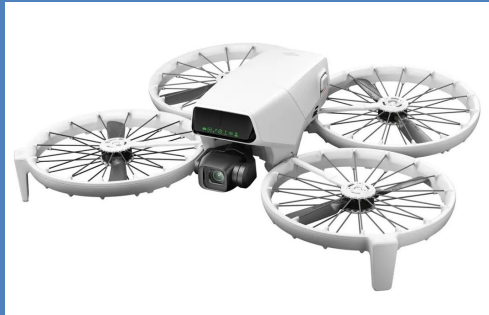
DJI NEO



- **NEO** – newest model – \$199

Recommended for VLOG
weighs 135 grams (0.29 lbs.)
12 to 30-minute flight time
Maximum range – 4.3 miles

DJI Flip



- **Flip** – \$439

weighs less than 249 grams (0.55 lbs.)

31-minute maximum flight time

Maximum range – 8 miles

DJI Mini



- **Mini 2 SE** – 6.2-mile range – \$280
- **Mini 4K** – 6.2-mile range – \$300
- **Mini 3** – 3.7-mile range – \$419
- **Mini 4 Pro** – 12.5-mile range – improved camera – \$759
- **Mini 5 Pro**** – \$1200

Minis weigh 249 grams (0.55 lbs.)

*Optional extended flight time battery or propeller guards increase the weight

** The Mini 5 Pro reportedly weights 251 grams

DJI AIR

Air 3S – 12-mile range – 724 grams (1.6 lbs.) – Upgraded Dual camera – \$1099

Air 3 – 12-mile range – 720 grams (1.6 lbs.) – Dual camera – \$1099



DJI Mavic

Mavic 3 Classic – 9-mile range –
958 grams (2.11 lbs.) – Hasselblad
camera – \$1275

Mavic 3 Pro Cine– Telephoto lens
– 963 grams (2.12 lbs.) – \$2199





DJI Avata

Avata 2 – New Model – 410 grams (0.9 lbs) – 6.2-mile range – includes goggles and motion controller – \$1000



DJI FPV



FPV – designed for drone racing. –
combo package includes
everything you need: the drone,
batteries, flight controller,
goggles, cables and spare parts –
795 grams (1.8 lbs.) –
Price \$999



DJI Phantom (No longer in production)

Phantom 4 Pro V2.0 – for professional or enterprise users – 6.2-mile range – 1375 grams (3 lbs.)

Phantom 4 Pro+ V2.0 – enhancements including improved resolution for on-controller live-view streaming, enhanced connectivity





DJI Phantom Consumer Drones

- Phantom 1
- Phantom FC40
- Phantom 2
- Phantom 2 Vision
- Phantom 2 Vision+
- Phantom 3
- Phantom 3 Advanced
- Phantom 3 Pro
- Phantom 3 SE
- Phantom 4K
- Phantom 4
- Phantom 4 Advanced
- Phantom 4 Pro
- Phantom 4 Pro V2.0
- Phantom 4 Pro+ V2.0

Specialized DJI Drones

- **Video** – Inspire 3 (\$16,499)
- **Enterprise** – Matrice & Mavic 3
- **Agriculture** – Agras T30 (\$15,999)
- **Mission Planning** – Terra (\$29,000) & Mavic 3M (\$5800)



DJI FlyCart 30

Weight – 143# with two batteries
plus 66# cargo

Max Flight Distance – 10 miles
(66# cargo, dual battery mode) and
5 miles (88# cargo, single battery
mode)

Price – \$42,000





DJI News

Frank Wang is founder and CEO of DJI. Wang founded DJI in 2006 and ran it out of his dorm room at Hong Kong University of Science & Technology.

DJI is headquartered in Shenzhen, China.



DJI Cybersecurity Concerns

The US Military has banned all purchases of Chinese manufactured drones due to cybersecurity concerns.

A report issued by the Pentagon said it didn't find any malicious code when it analyzed DJI drones.

The Department of Homeland Security ran tests on the DJI Mavic Pro and Matrice 600 Pro and didn't find evidence of data being sent overseas.



In 2020, the U.S. Treasury Department banned Americans from trading public securities in eight Chinese technology firms including DJI because of their alleged involvement in surveillance of Uyghur Muslims in the People's Republic.

The Commerce Department placed DJI on the "entity" list in 2020. This barred U.S. companies from exporting products to DJI, which has been deemed a national security threat by the Defense Department.

“All DJI products are designed for civilian purposes and cannot meet the requirements of military specifications. We do not support applications for military purposes.” – **DJI statement**

However, DJI drones have been used by both side in the Ukrainian conflict.



Chinese Drone Ban



The **2024 National Defense Authorization Act (NDAA)** requires a US national security agency to complete a formal security review of DJI and Autel drones by December 23, 2025. If no agency does the audit, DJI and Autel will be automatically added to the FCC Covered List, which would effectively ban new drones from being imported or sold in the US. The ban could cause problems for firmware updates, warranty and getting replacement parts.

What's Likely to Happen

If DJI drones are banned, DJI will likely sell their drones under different brand names through third-parties like Amazon. The National Defense Authorization Act ban listed Chinese companies by name, so “new” companies are not immediately banned.



FAA Drone Ban



The Federal Communications Commission (FCC) has recently voted to expand its authority to potentially ban electronic devices, including DJI & Autel drones, if they are deemed national security risks. This decision allows the FCC to retroactively ban devices that were previously approved for sale if their manufacturers are later added to the FCC's "Covered List".

What's Likely to Happen

If the FCC takes action to “delicense” DJI drones, it will not affect their operation on the 2.4 GHz and 5.8 GHz frequencies, as these are public use frequencies.



Users may not be able to obtain air clearances or waivers for DJI drones, which will limit their commercial use.

Other Drone Makers

There are other
drone manufacturers

No one has the
variety that DJI offers

DJI tends to set the
market price

**Skydio and Parrot exited the
consumer drone market in 2023.**

Drone News

- Amazon, Alphabet (Wing), Intel Corp, AT&T and Uber are developing drones inhouse.
- Amazon and Google have received FAA permission to conduct limited drone deliveries
- Amazon “Prime Air” drone can carry up to a 5-pound payload





FAA Registered Drone Pilots

As of July 2025

- 1,121,891 recreational sUAS pilots
- 400,000+ recreational drones
- 460,375 commercial sUAS pilots (there were 160,000 in 2019)
- 433,407 commercial drones

US Drone Pilot Income

- 70% earn less than \$50,000 per year
- 13% earn between \$50,000 to \$100,000 per year
- 17% earn more than \$100,000 per year
- Hourly rates range from \$150 to \$200 per hour
- Drone mapping specialists earn more than general drone service providers

The Future

- **Recreational Drone** sales have plateaued
- **Commercial Drone** sales are still growing
- **Top markets** are Photography, Surveying, Construction, Agriculture, Emergency Response & Electrical Energy
- **More Regulation** – Public Distrust & Privacy
- **Beyond Visual Line of Sight** (BVLOS) rules are under development

You Are Responsible

The drone pilot is ultimately responsible for all aspects of the flight, including where it flies, how high it flies, and that all rules and regulations are followed.

