

# Agriculture, Drones, & UAV's, Unmanned Aircraft Vehicles

PSU Extension Dairy/Crop Team  
J. Craig Williams, Tioga County,



## What is a UAV?



DJI Phantom 2-3



Maverick - Remote Intelligence

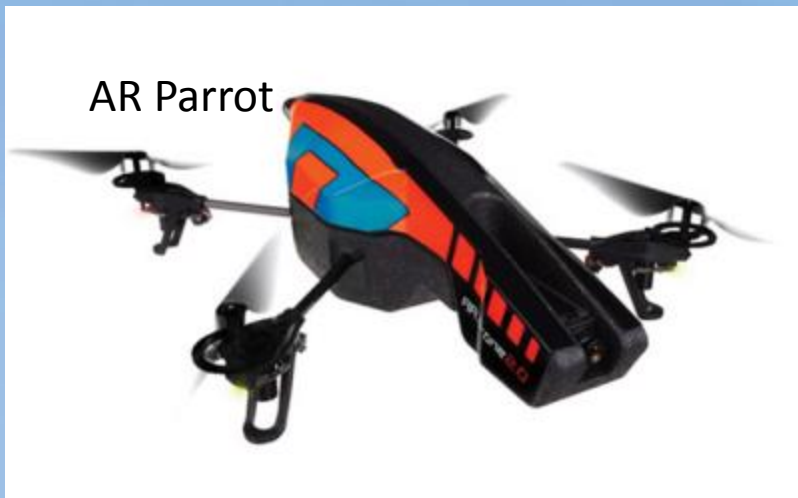
## What is a UAV?



Precision Drone



DJI Inspire 1 Released November 2014

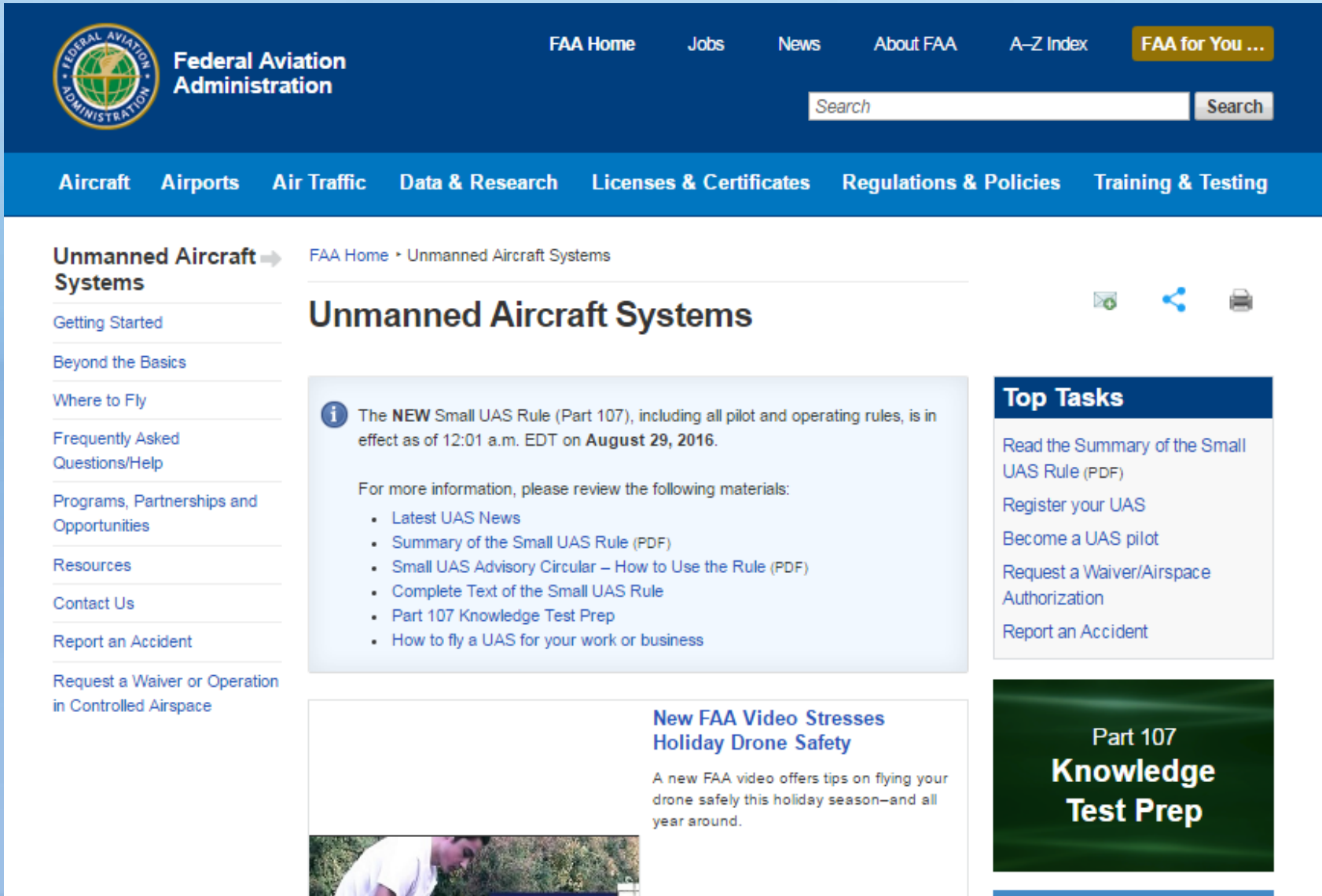


AR Parrot

DJI MAVIC



## Whose in Charge? FAA [www.faa.gov/uas/](http://www.faa.gov/uas/)



The screenshot shows the FAA's Unmanned Aircraft Systems (UAS) website. The top navigation bar includes links for FAA Home, Jobs, News, About FAA, A-Z Index, and a search box. Below this is a secondary navigation bar with categories like Aircraft, Airports, Air Traffic, Data & Research, Licenses & Certificates, Regulations & Policies, and Training & Testing. The main content area features a left sidebar with links such as 'Getting Started', 'Beyond the Basics', and 'Where to Fly'. The central content area is titled 'Unmanned Aircraft Systems' and contains an information box about the new Small UAS Rule (Part 107) effective August 29, 2016, along with a list of related materials. To the right, there is a 'Top Tasks' section with links to read the summary, register a UAS, become a pilot, request a waiver, and report an accident. At the bottom, there is a video link titled 'New FAA Video Stresses Holiday Drone Safety' and a large green button for 'Part 107 Knowledge Test Prep'.

**Federal Aviation Administration**

FAA Home Jobs News About FAA A-Z Index **FAA for You ...**

Search Search

Aircraft Airports Air Traffic Data & Research Licenses & Certificates Regulations & Policies Training & Testing

**Unmanned Aircraft Systems** → [FAA Home](#) • [Unmanned Aircraft Systems](#)

## Unmanned Aircraft Systems

**i** The **NEW** Small UAS Rule (Part 107), including all pilot and operating rules, is in effect as of 12:01 a.m. EDT on **August 29, 2016**.

For more information, please review the following materials:

- [Latest UAS News](#)
- [Summary of the Small UAS Rule \(PDF\)](#)
- [Small UAS Advisory Circular – How to Use the Rule \(PDF\)](#)
- [Complete Text of the Small UAS Rule](#)
- [Part 107 Knowledge Test Prep](#)
- [How to fly a UAS for your work or business](#)

**Top Tasks**

- [Read the Summary of the Small UAS Rule \(PDF\)](#)
- [Register your UAS](#)
- [Become a UAS pilot](#)
- [Request a Waiver/Airspace Authorization](#)
- [Report an Accident](#)

**New FAA Video Stresses Holiday Drone Safety**

A new FAA video offers tips on flying your drone safely this holiday season—and all year around.

**Part 107 Knowledge Test Prep**



<http://knowbeforeyoufly.org/>  
<https://www.faa.gov/uas/faq/>

## I FLY SAFE



All drones are aircraft—even the ones at the toy store.  
So when I fly a drone I am a pilot.  
Before I fly I always go through my pre-flight check list.  
I regularly check the safety guidelines at [faa.gov/uas](http://faa.gov/uas)



Federal Aviation  
Administration

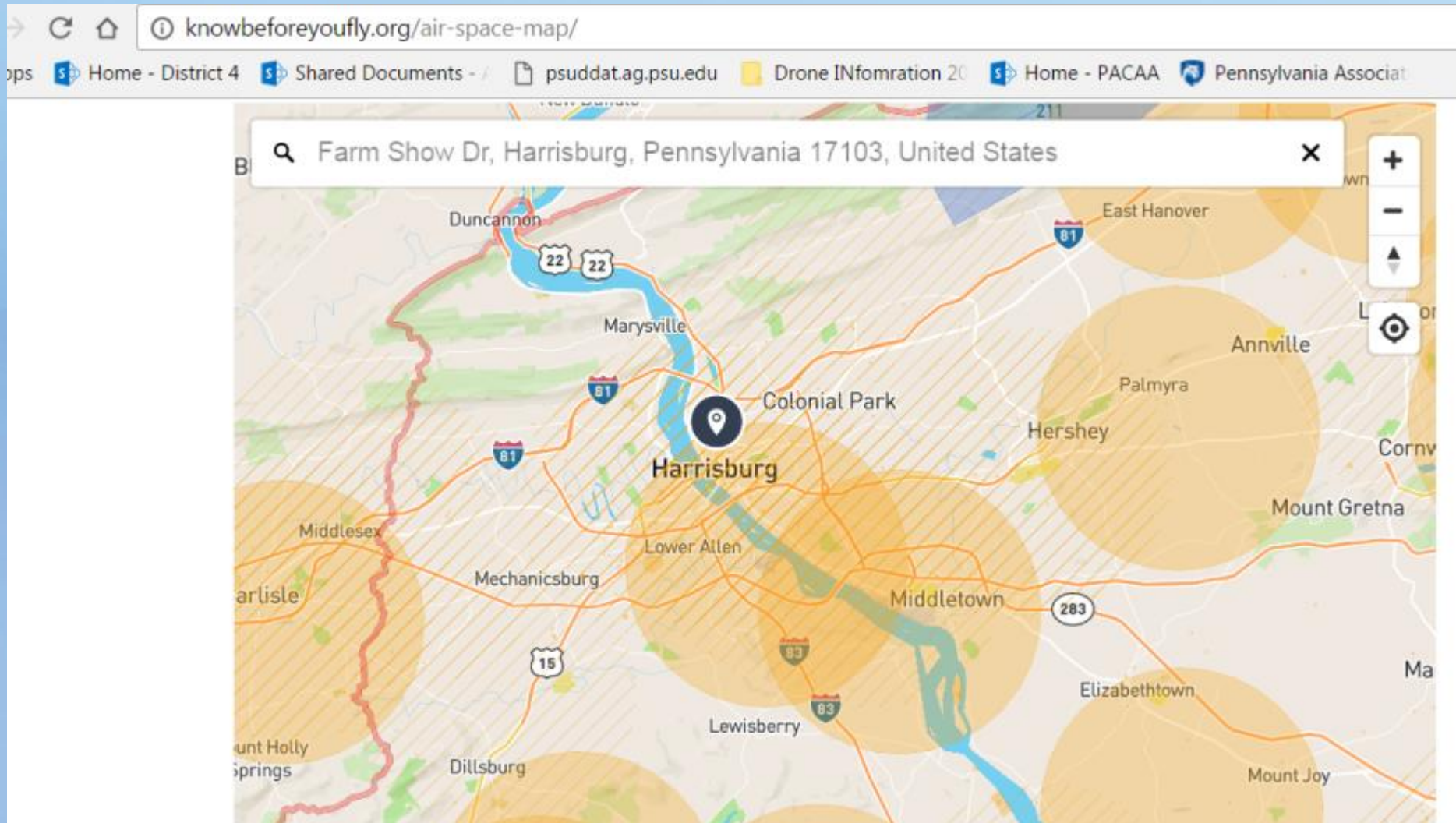
FLY SMART, FLY SAFE, AND HAVE FUN!

[knowbeforeyoufly.org](http://knowbeforeyoufly.org) | [faa.gov/uas](http://faa.gov/uas)

## PRE-FLIGHT CHECKLIST

- 1 I fly below 400 feet
- 2 I always fly within visual line of sight
- 3 I'm aware of FAA airspace requirements: [faa.gov/go/uastfr](http://faa.gov/go/uastfr)
- 4 I never fly over groups of people
- 5 I never fly over stadiums and sports events
- 6 I never fly within 5 miles of an airport without first contacting air traffic control and airport authorities
- 7 I never fly near emergency response efforts such as fires
- 8 I never fly near other aircraft
- 9 I never fly under the influence

## Knowbeforeyoufly air space maps



## Who am I?

- Hobbyist
  - Who enjoys flying UAV's below 400 FT for my enjoyment
  - Register with FAA
  - In PA ---17,145 registered
- Business
  - Register with FAA and Part 107 Rules
  - Use UAV for Work
  - In PA -----128 registered Per FAA ( May 2016)

# FAA Policy



- Hobbyist
  - Follow Academy of Model Aeronautic (AMA) guidelines
  - Mandatory UA registration (>.55 lbs)
  - Students may fly under hobbyist rules for class purposes
- Commercial operations
  - Follow new Part 107 rules
  - Mandatory UA registration (> . 55 lbs)
  - Requires remote pilot certificate



## FAA Commercial Use

- Take a photo of your garden with UA
  - Turn on sprinkler
  - OK because it is a hobby activity
  
- Take a photo of your crop with UA
  - Turn on irrigation
  - Requires remote pilot certificate because it is a commercial activity



## FAA sUAS Rules

- UAS
  - Register all vehicles
  - Under 55 pounds
  - Visual line of sight (VLOS)
  - Daylight
  - Maximum 400 ft above ground level (AGL)
  - At least 5 miles from airport
- Remote pilot certificate
  - Register with FAA
  - On-line knowledge test



<b>Pilot Requirements</b>	No pilot requirements	<b>Must have Remote Pilot Airman Certificate</b> <b>Must be 16 years old</b> <b>Must pass TSA vetting</b>
<b>Aircraft Requirements</b>	Must be registered if over 0.55 lbs.	<b>Must be less than 55 lbs.</b> <b>Must be registered if over 0.55 lbs. (online)</b> <b>Must undergo pre-flight check to ensure UAS is in condition for safe operation</b>
<b>Location Requirements</b>	5 miles from airports without prior notification to airport and air traffic control	Class G airspace*
<b>Operating Rules</b>	<b>Must ALWAYS yield right of way to manned aircraft</b> <b>Must keep the aircraft in sight (visual line-of-sight)</b> <b>UAS must be under 55 lbs.</b> <b>Must follow community-based safety guidelines</b> <b>Must notify airport and air traffic control tower before flying within 5 miles of an airport</b>	<b>Must keep the aircraft in sight (visual line-of-sight)*</b> <b>Must fly under 400 feet*</b> <b>Must fly during the day*</b> <b>Must fly at or below 100 mph*</b> <b>Must yield right of way to manned aircraft*</b> <b>Must NOT fly over people*</b> <b>Must NOT fly from a moving vehicle*</b>
<b>Example Applications</b>	Educational or recreational flying only	<b>Flying for commercial use (e.g. providing aerial surveying or photography services)</b> <b>Flying incidental to a business (e.g. doing roof inspections or real estate photography)</b>
<b>Legal or Regulatory Basis</b>	<b>Public Law 112-95, Section 336 – <i>Special Rule for Model Aircraft</i></b> <b>FAA Interpretation of the Special Rule for Model Aircraft</b>	<b>Title 14 of the Code of Federal Regulation (14 CFR) Part 107</b>

Line of Sight

1800 feet





## Public/ Government Register Part 107 or COA

### What Can You Do With Your Unmanned Aircraft?

Use this chart to determine whether you need FAA permission to operate your unma



### Who are you?

#### Public/Government Entity

- Local / State Government
- Local Law Enforcement
- First Responder
- Public University

#### Civil/Non-Government Entity

- Individual / Hobbyist
- Company / Business / Non-Profit
- Private University
- Entrepreneur flying for business pursuit

#### UAS Manufacturer

You need a public [Certificate of Authorization \(COA\)](#).

# UAV rules

- The Public official
  - What restrictions do FAA COAs place on UAS operations?
  - Flight only below 400
  - Daytime operations in Visual Flight Rules (VFR) - clear of clouds and fog
  - Nighttime operations are being considered on a case by case basis
  - Visual Line-Of-Sight (VLOS) of the UAS (typically, less than 3/4 of a mile
  - Restrictions over types of airspace **within 5 miles of airport** Requirement to contact local air traffic control authorities prior to UAS operations
  - Medical tests to ensure visual acuity (FAA Second-Class Medical Exam)
  - Knowledge of airspace and FAA regulations applicable to the operation of UAS (UAS pilot must pass the FAA private pilot ground written examination
  - Training on the system to be flown and proficiency requirements

## Sect 333 Business

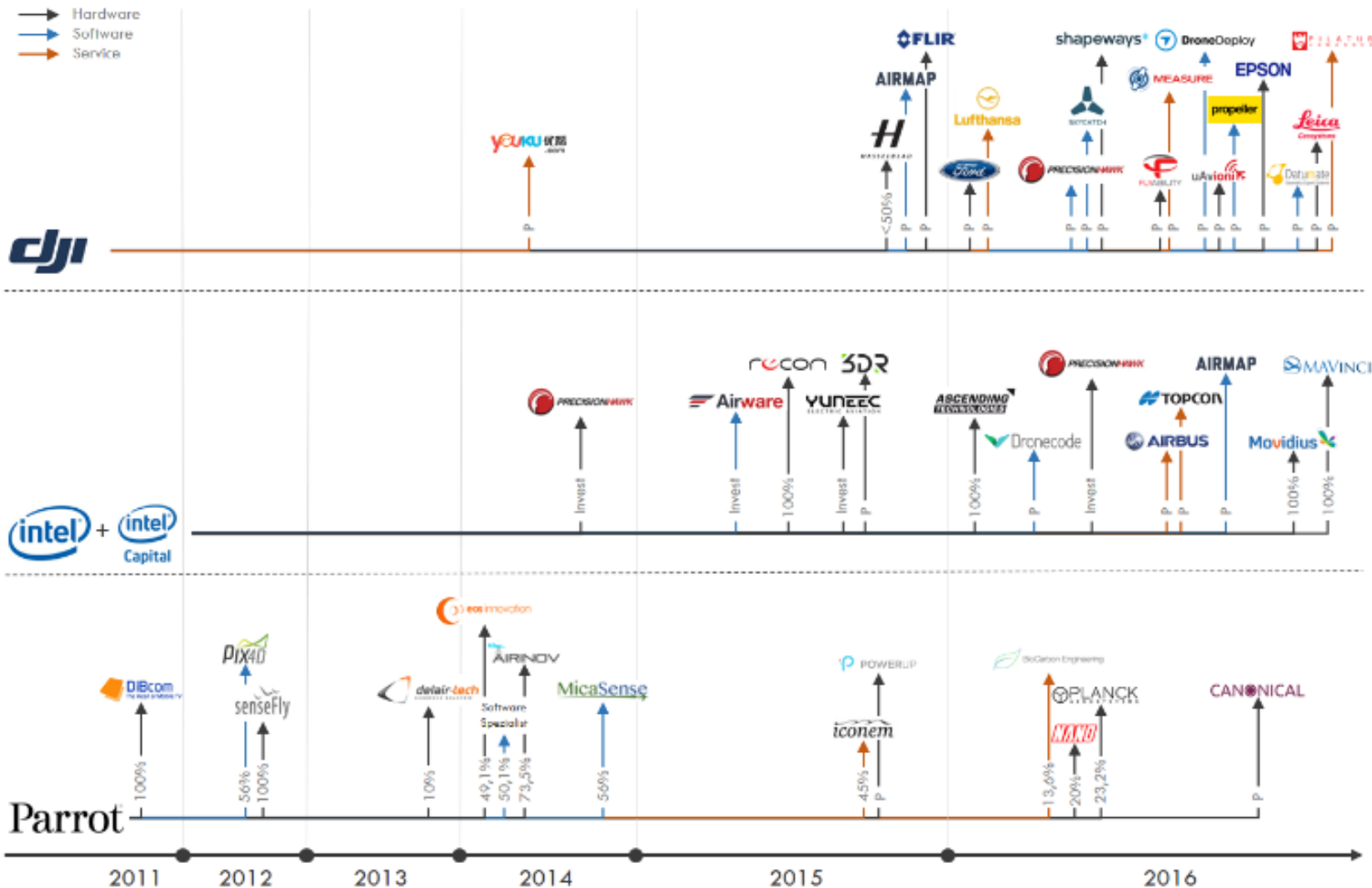
- FAA Sect 333
  - [https://www.faa.gov/uas/legislative\\_programs/section\\_333/](https://www.faa.gov/uas/legislative_programs/section_333/)
    - a Section 333 grant of exemption,
    - a Certificate of Waiver or Authorization (COA),
    - an aircraft registered with the FAA, and
    - a pilot with an FAA airman certificate
- *PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate.*

# Penn State Extension

## DRONE INDUSTRY INSIGHTS

### DJI, Intel & Parrot – Partnerships, Investments and Acquisitions

- Hardware
- Software
- Service



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So What's a farmer TO DO



Penn State **Extension**

# Hires a Flying company?





# Real Pictures Parrot



# Real Pictures DJI





# Maverick



Penn State **Extension**

# DJI Phantom 3





# DJI Phantom 3



# DJI Phantom 3





# DJI Phantom 3





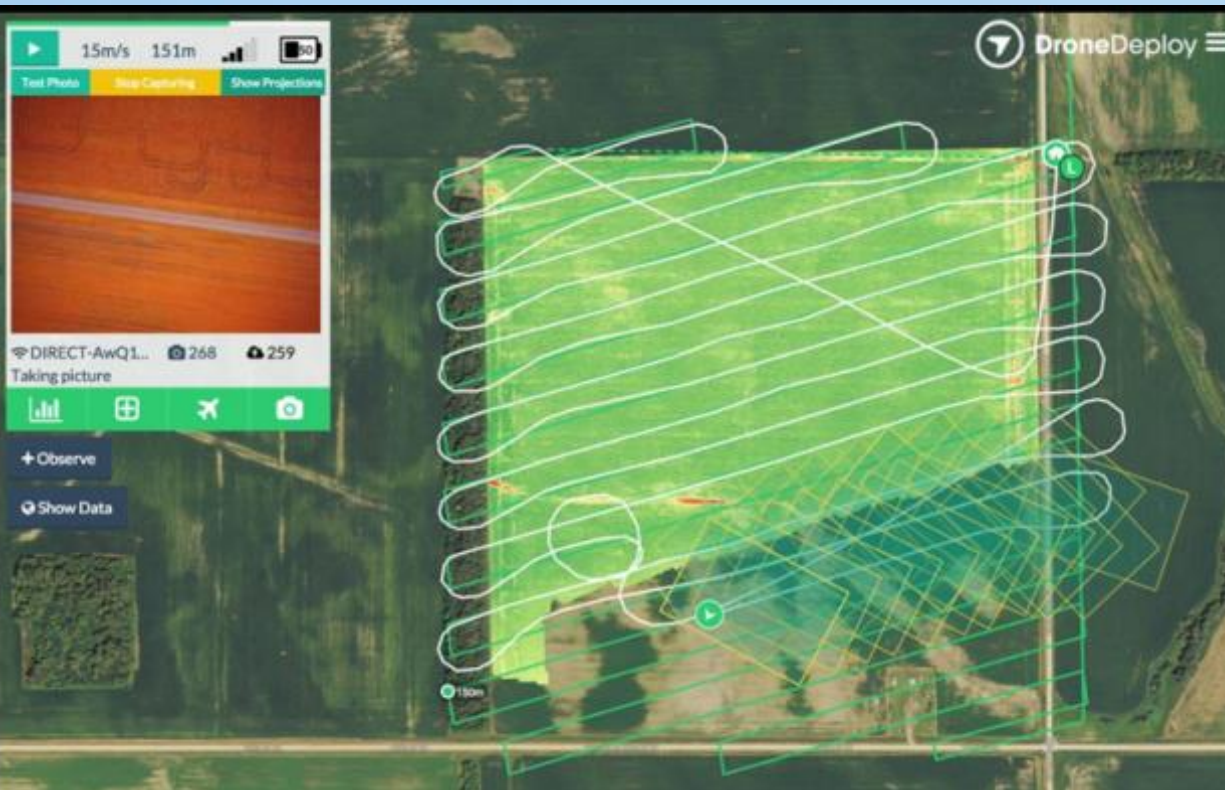
# DJI Phantom 3



# Drone Deploy, [www.dronedeploy.com/](http://www.dronedeploy.com/)

- Ian Butler
- Twitter
- Youtube education channel
- Launched in July 2015!
- Works with DJI Phantom, Inspire, Ag Eagle
- Flight CONTROL FOR PLANNED FLIGHTS,
- Saved photos
- Produced maps for photo, NDIV, 3-D
- Upload and map
- Price structure from Free to \$99/month - \$499/month

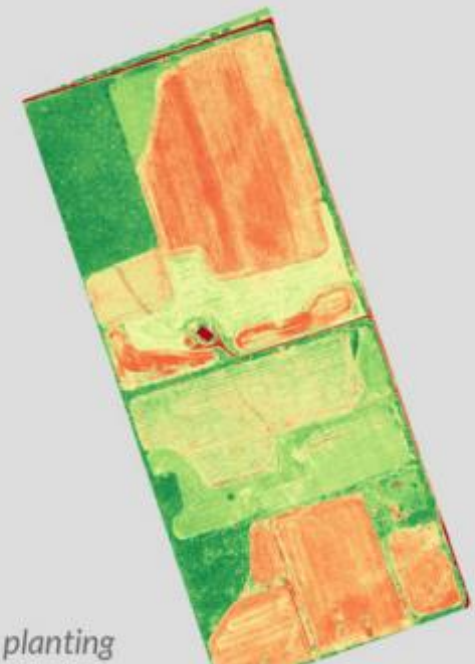
## Flight control and mapping



DroneDeploy Like This Page · July 16 · Edited ·

We hear the term 'real-time mapping' thrown around a lot by our competitors but never see any actual results. The image below is from this morning. One of our mappers using his AgEagle, powered by DroneDeploy, to get true, real-time maps.

65%+ of his map is "already" stitched before drone even lands.



After planting



# DJI Phantom fly over example

- Youtube
- Combine example
- <https://youtu.be/po-nkATCwV8>
  
- Variety Example
- <https://youtu.be/qTOQz9podS0>
  
- Chad Colby <https://youtu.be/YhxDsSgoRzw>

# www.sites.psu.edu/uaaa

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Unmanned Aircraft for Agr... x

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Sites at Penn State Log in

## Unmanned Aircraft for Agricultural Applications

The Pennsylvania State University

Home Current Projects Plants-Soil-Water Systems Software Education Student Activities Links

### Home

Welcome to Unmanned Aircraft for Agricultural Applications (UAAA).

We are building a knowledge base and technology infrastructure to facilitate collaboration between plant scientists, hydrologists, engineers, private industry, government and the general farm community. Our goal is to help scientists and farmers use unmanned aircraft to improve water quality, increase crop yields, reduce production costs and prevent exposure to tedious or hazardous work environments.

Specifically we will –

- Develop, test and disseminate new methods for inspecting and treating plants, soil and water using unmanned aircraft;
- Promote commercialization of unmanned aircraft systems and services unique to agriculture; and
- Provide a training program for safe, ethical and cost-effective use of unmanned aircraft.

This will be a journey to an open-ended destination. Please join with us and share the fun.

**SEARCH THIS SITE**

**CONTACT**  
[uaaa@psu.edu](mailto:uaaa@psu.edu)  
H.J. Sommer III  
Professor of  
Mechanical Engineering

**RECENT NEWS**

14.05.05 - West Halls spring flyover  
by Mitchell Lester

14.04.30 - Rec Hall flights cancelled  
until fall semester.

14.03.05 - **COME FLY WITH US** - We  
meet every Thursday from 8:00-9:00  
AM in South Gym of Rec Hall. Please  
bring safety glasses.

14.02.18 - PSU winter campus tour  
by Mitchell Lester using DJI Phant  
om 2 Vision +

## Learn online -Twitter/ Youtube:/ Facebook

- eXtension UAS group <http://www.learnuasag.org/>  
[@learnuasag](#)
- Drone Deploy [www.dronedeploy.com](http://www.dronedeploy.com)
- Precision Hawk Systems <http://www.precisionhawk.com/>
- Chad E Coby / AgTechtalk - [@TheChadColby](#)
- Ian Butler [@theUAVguy](#)
- UAV Grass Roots [@uavgrassroots](#)
- Victor Villegas - Drone singer - [@OSUExtTech](#)  
Oregon State University Extension
- FlyingAg.com [@FlyingAGUAV](#)
- DJI Videos [www.dji.com](http://www.dji.com)

## The UAV business is ready for agricultural guidance

- J Craig Williams
- Penn State Dairy
- & Crop Team
- [jcw17@psu.edu](mailto:jcw17@psu.edu)
- Twitter @jcwcelb
  
- PSU Site
- [www.sites.psu.edu/uaaa](http://www.sites.psu.edu/uaaa)

