

# Drones in the City of Cupertino

An overview of Cupertino's Drone Program and Hardware

March 2022



CUPERTINO



# Overview

1. Definitions
2. Background
3. Potential Use Cases
4. Staff Training
5. Drone Selection
6. Privacy

## Definitions:

UAV and UAS

FAA and PART 107

# Definitions

## UAV (Unmanned Aerial Vehicle)

- An aircraft that can be flown without human pilots, crew, or passengers on board
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## UAS (Unmanned Aerial System)

- Includes all components of flying the UAV, including controller, and other support systems

# Definitions

## **FAA (Federal Aviation Administration)**

Regulates all civil aviation in the country

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## FAA (Federal Aviation Administration)

Regulates all civil aviation in the country

## **PART 107** (14 CFR PART 107 Small Unmanned Aircraft Systems)

Code of federal regulations involving small unmanned aerial systems (sUAS)

sUAS refers to operations of UAVs under 55lbs

# Background



# Background

## Disaster Response

# Background

## Disaster Response

### Firefighters get a toehold on fire in Santa Cruz Mountains, but progress may not last

Flames from CZU Complex fire in Santa Cruz and San Mateo counties now encompass 63,000 acres



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1 of 17

BOULDER CREEK, CA - AUGUST 21: Laneside Fire Protection District firefighters wait before they are dispatched to battle a fire on Aug. 21, 2020, in Boulder Creek, Calif., as the CZU August Lightning Complex fire burns in the Santa Cruz Mountains. (Dai Sugeno/Bay Area News Group)

By **TIONA KELLNER** and **LOUIS HANSEN** | [thansen@bayareanews.com](mailto:thansen@bayareanews.com) | Bay Area News Group  
PUBLISHED: August 23, 2020 at 7:30 a.m. | UPDATED: August 22, 2020 at 7:46 a.m.

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San Jose Mercury News - 2020

### San Jose flooding: Thousands ordered to leave homes

By **Steve Almasy** and **Carma Hassan**, CNN  
Updated 9:59 PM EST, Wed February 22, 2017



1 of 18

Rescue crews steer a boat full of residents in a flooded San Jose, California, neighborhood on Tuesday, February 21. One of Southern California's most powerful storms in recent years has caused flooding, power outages and blackouts across the region.

CNN - 2017

CBS San Francisco

### Update: PG&E Plans Sunday Power Shutoffs for 1 Million ...

San Francisco is the only Bay Area county that will not be impacted by the PSPS. The National Weather Service issued red flag warnings for...

Oct 23, 2020



CBS San Francisco - 2020

# Background

Safely Gather Situational Awareness

# Background

## Safely Gather Situational Awareness

### Above Devastated Houston, Armies of Drones Prove Their Worth

After the hurricane, professional drone pilots get to work.



Residential neighborhoods near Interstate 10 sit in floodwater in the wake of Hurricane Harvey on August 26, 2017 in Houston, TX. **MARCUS YAM/LOS ANGELES TIMES/GETTY IMAGES**

Wired.com - 2017

### Drones map the Camp Fire

Bill Gabbert November 24, 2018 Drone/UAV/UAS California, Camp Fire

The photos and videos can help residents check the status of their homes



Photo taken by a drone in Paradise near Kilcrease Circle.

FireAviation.com - 2018

# Background

Researching Other Use Cases

# Background

## Researching Other Use Cases



City of Los Angeles  
Department of Public Works  
Bureau of Engineering

### Unmanned Aerial System (UAS) Flight Operations Manual

City of Los Angeles Public Works

A photograph of a person in a yellow safety vest and hard hat walking on a dirt path through a hilly, vegetated area. In the background, there are mountains and a winding road. A small drone is visible in the sky.

**DRONES FOR  
PLANNING: A HIGHER STANDARD**

Join us for a webinar on  
DRP's new Unmanned  
Aircraft Systems (UAS)  
Program.

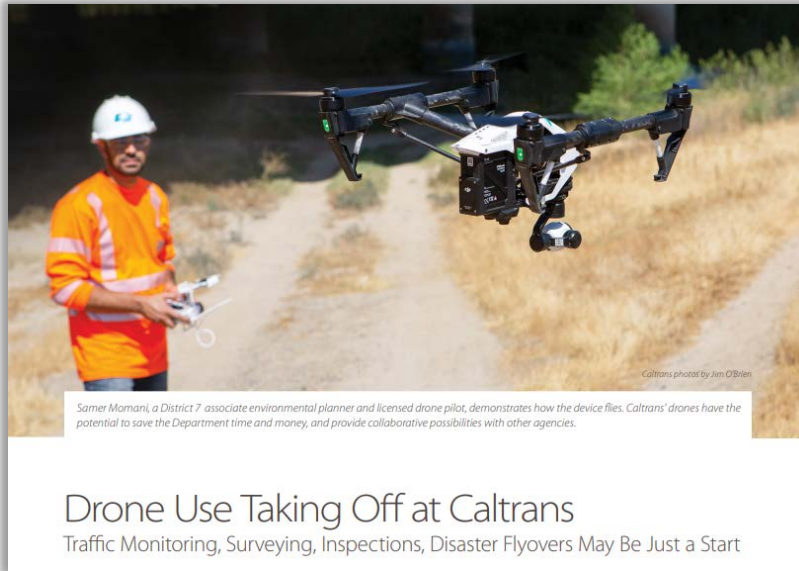
**MAY 27, 2020 @ 2pm**  
Skype link:  
[bit.ly/2WtlgAc](https://bit.ly/2WtlgAc)

Learn more at: [PLANNING.LACOUNTY.GOV/UAS](https://PLANNING.LACOUNTY.GOV/UAS)

Los Angeles County Planning

# Background

## Researching Other Use Cases



Caltrans

### SCVTA using drones to aid in BART extension construction

Written by Jennifer Nunez, assistant editor



SCVTA celebrates one million safe man hours on the project by having construction workers form 1,000,000 and taking a picture with a drone.

Santa Clara Valley Transit Authority

# Background

Identifying Use Cases in Cupertino



# Background

Identifying Use Cases in Cupertino

1. Disaster Response
2. Construction Monitoring
3. Site Modeling
4. Inspections

# Potential Use Cases

# Potential Use Cases

Disaster Response

# Potential Use Cases

## Disaster Response

Having pilots on staff allows the City to have a quick and dynamic response in times of emergency



# Potential Use Cases

## Construction Monitoring



Library Expansion



Apple Campus 2 Construction – Youtube 2014

# Potential Use Cases

## Site Modeling



Model Existing Sites



Model Site Potential



# Potential Use Cases

## Inspections



Roof Inspections



Tree Inspections

# Staff Training



# Staff Training

Flight Training

# Staff Training

## Flight Training

### In-Person training with Professional Drone Pilot

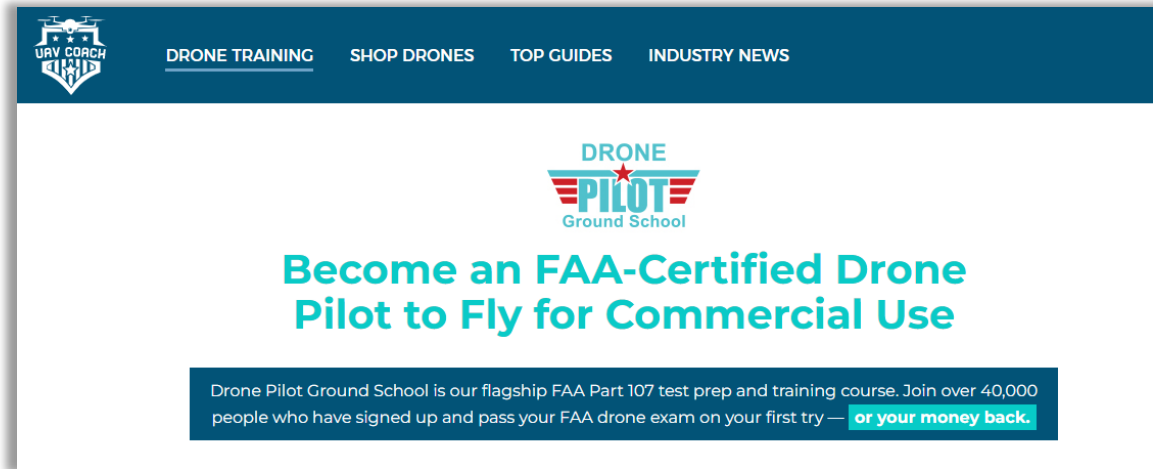


# Staff Training

Understanding Rules and Regulations

# Staff Training

## Understanding Rules and Regulations



The screenshot shows the homepage of the Drone Pilot Ground School website. At the top is a dark blue navigation bar with the 'UAV COACH' logo on the left and four menu items: 'DRONE TRAINING' (underlined), 'SHOP DRONES', 'TOP GUIDES', and 'INDUSTRY NEWS'. Below the navigation bar is a white section featuring the 'DRONE PILOT Ground School' logo, which includes a red star above the word 'PILOT'. The main heading in teal reads 'Become an FAA-Certified Drone Pilot to Fly for Commercial Use'. At the bottom, a dark blue banner contains white text stating: 'Drone Pilot Ground School is our flagship FAA Part 107 test prep and training course. Join over 40,000 people who have signed up and pass your FAA drone exam on your first try — or your money back.'

UAV COACH

[DRONE TRAINING](#) [SHOP DRONES](#) [TOP GUIDES](#) [INDUSTRY NEWS](#)

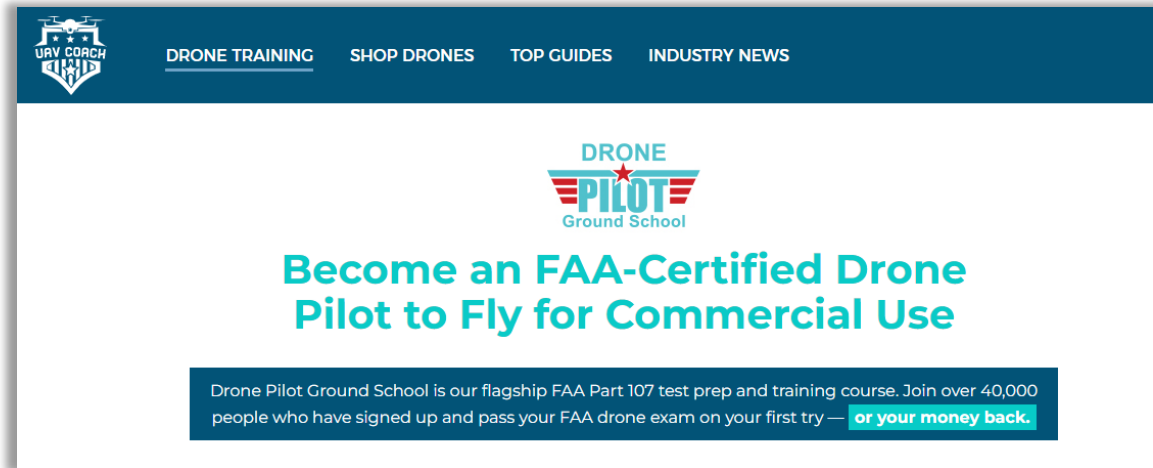
DRONE  
**PILOT**  
Ground School

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- 3 pilots currently certified
- All additional pilots must pass Part 107 / register as airman with FAA

# Staff Training

## Recurring Training

- 4 training sessions per year
- 2 training sessions with certified instructor

# Drone Selection

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## Current Drone Fleet



DJI Inspire 2 – image from PCMag.com



DJI Mavic Mini 2 – image from 4kshooters.com



# Drone Selection

## Current Drone Fleet



Skydio X2E

- Lightweight
- Portable
- Sophisticated obstacle avoidance
- Capable of Autonomous Flight
- Thermal

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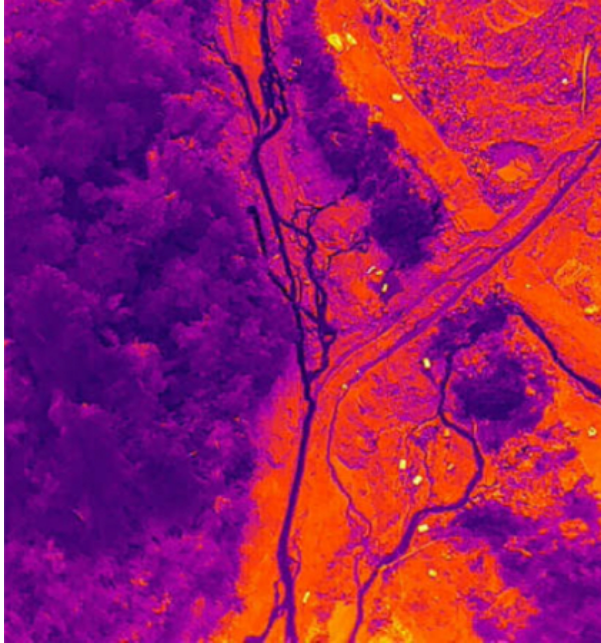
Also evaluated: Mavic Enterprise Advanced, DJI Matrice 300 RTK, Autel Evo II Dual R Drone, Altavian Galaxy R8700, Parrot Anafi Thermal, and the Skydio X2E

# Drone Selection

Why Thermal?

# Drone Selection

## Why Thermal? – Disaster Response

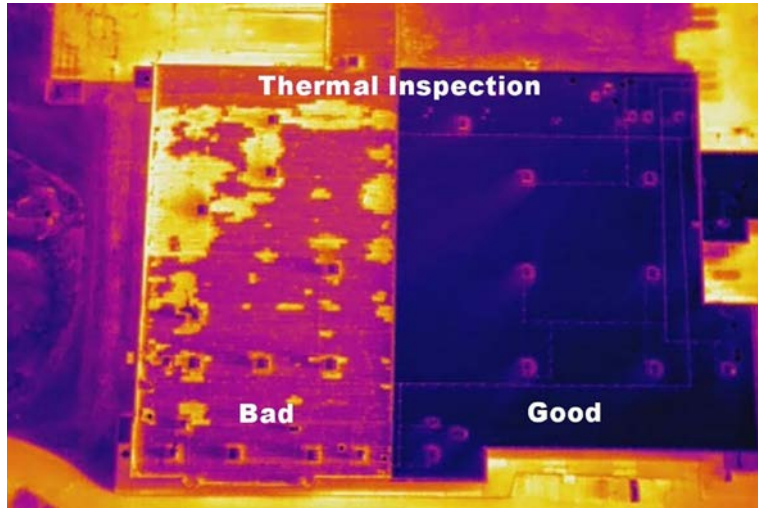


Thermal Imagery from DJI

- Enhanced visibility for search and rescue
- Identify hazards invisible to naked eye
- Thermal cameras cannot see through walls

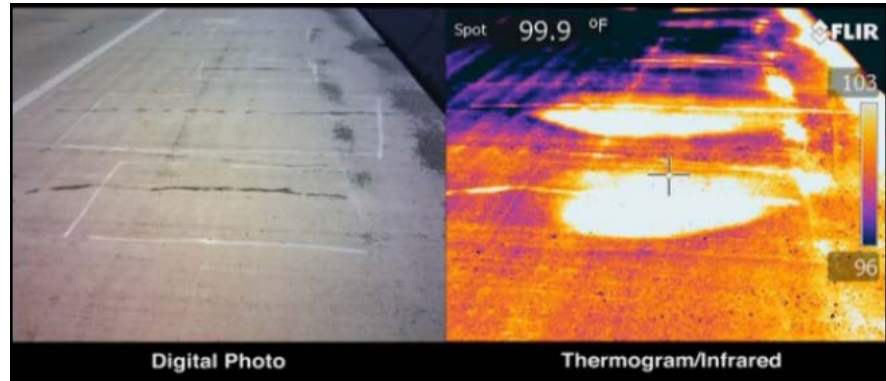
# Drone Selection

## Why Thermal? – Infrastructure Inspections



Roof Inspection from Denver Drone Imaging

- Identify faults invisible to naked eye
- Improve energy conservation by identifying heat leaks
- Suitable for roofs, roads, bridges, etc.



Road Inspection from [aerobatics.com](http://aerobatics.com)

# Privacy

How the City will Protect Privacy of Residents

# Privacy

## How the City will Protect Privacy of Residents

- Missions must be pre-approved before deployment
- Drones will not be used to spy on residents
- Pilots will respect private space
- Use of thermal camera will have clear business case and be pre-approved before deployment
- Only certified pilots allowed to fly

# Questions



**CUPERTINO**