# 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
- Commonly known as “drones”

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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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## 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

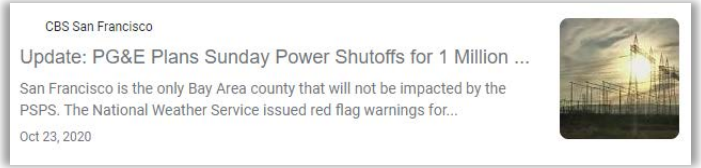
## Disaster Response

# Background

## Disaster Response

San Jose Mercury News - 2020

CNN – 2017




CBS San Francisco - 2020

# Background

## Safely Gather Situational Awareness

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## 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 29, 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

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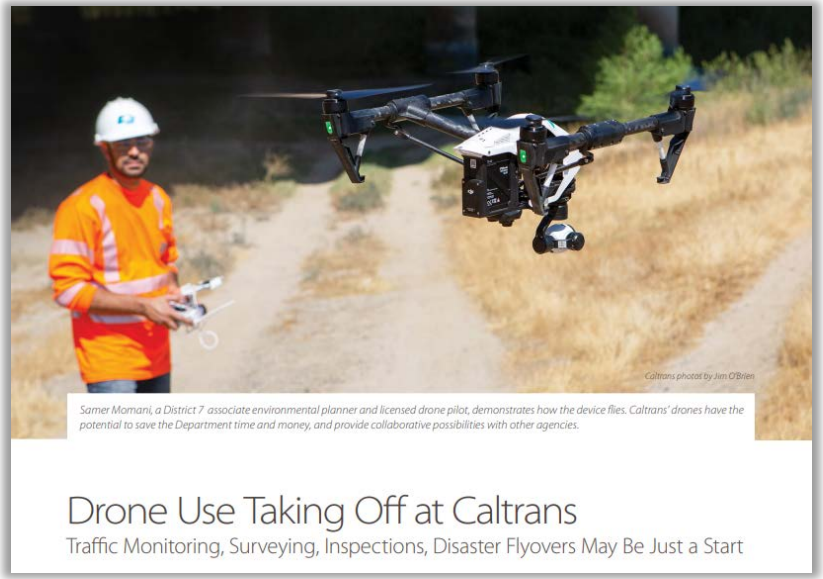
City of Los Angeles Public Works

Los Angeles County Planning

# Background

## Researching Other Use Cases



Caltrans photos by Jim O'Brien

Samer Momani, a District 7 associate environmental planner and licensed drone pilot, demonstrates how the device flies. Caltrans' drones have the potential to save the Department time and money, and provide collaborative possibilities with other agencies.

Drone Use Taking Off at Caltrans

Traffic Monitoring, Surveying, Inspections, Disaster Flyovers May Be Just a Start

Caltrans

SCVTA using drones to aid in BART extension construction

Written by Jenifer 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

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## Identifying Use Cases in Cupertino

1. Disaster Response

2. Construction Monitoring

3. Site Modeling

4. Inspections

# Potential Use Cases

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## Disaster Response

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## 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

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## Flight Training

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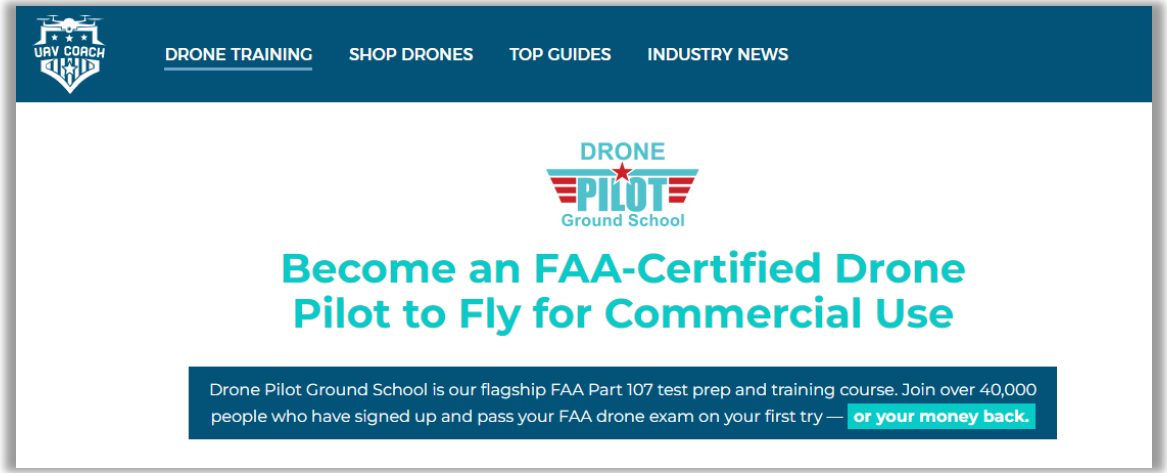
### In-Person training with Professional Drone Pilot

# Staff Training

## Understanding Rules and Regulations

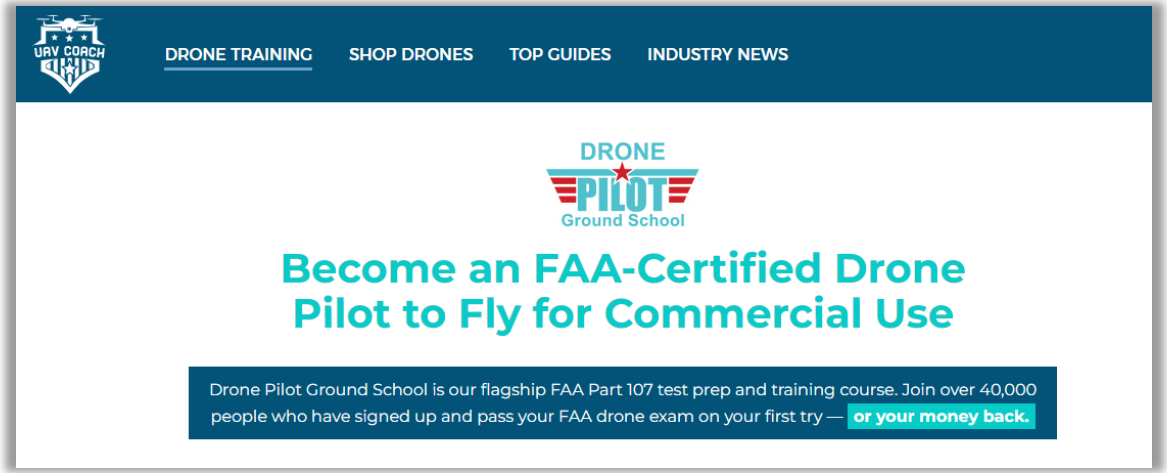
# Staff Training

## Understanding Rules and Regulations



# Staff Training

## Understanding Rules and Regulations




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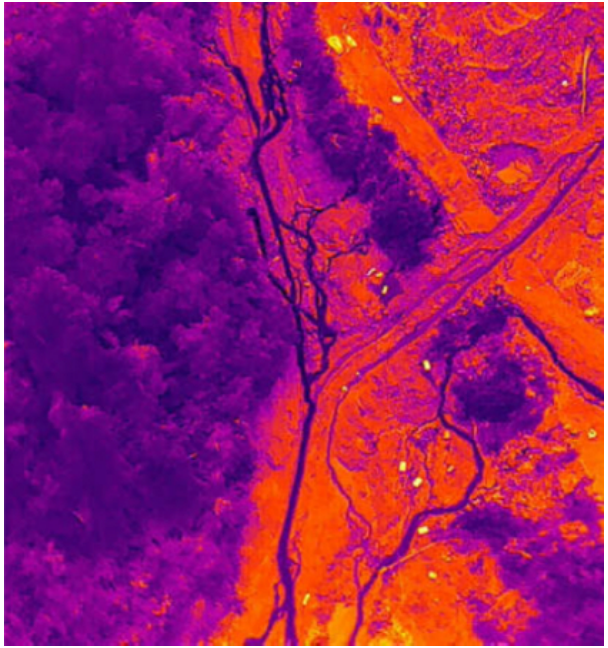
Also evaluated: Mavic Enterprise Advanced, DJI Matrice 300 RTK, Autel Evo II Dual R Drone, Altavian Galaxy R8700, Parrot Anafi Thermal, and the Skydio X2E

# Drone Selection

## Why Thermal?

# Drone Selection

## Why Thermal? – Disaster Response

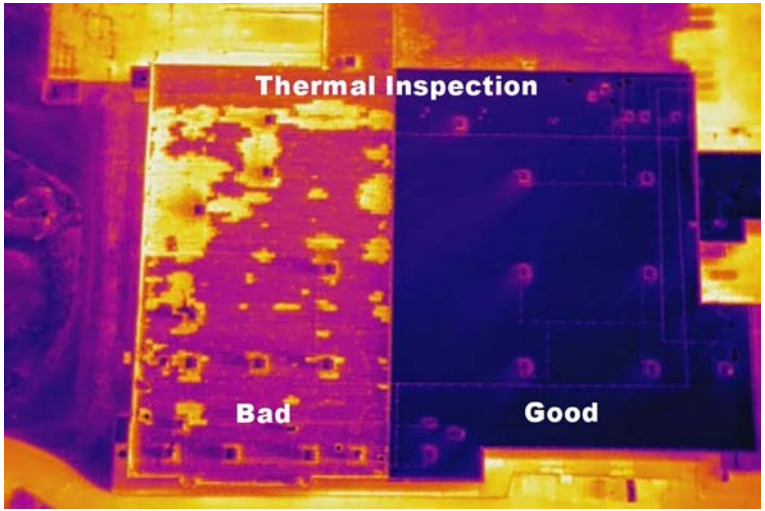


Thermal Imagery from DJI

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

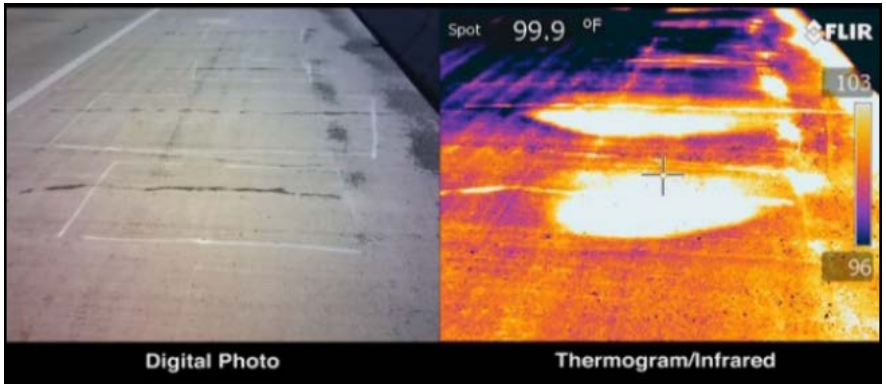
# Drone Selection

## 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

# 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