

Raymond Engineering – Georgia, Inc.
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DRONING ON ABOUT DRONES

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RAYMOND
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Course

This course gives the audience an understanding of the history of drones and associated technology; and how the development and use of drones have evolved over time. Additionally, the course includes performing an actual drone demonstration showing how a drone currently works and how they can be used by building/property owners, architects, engineers, consultants, and/or contractors.



Learning

At the end of the this course, participants will be able to:

- Learning Objective 1: Understanding how drones got their start and have evolved over time.
- Learning Objective 2: Overview of the types of drones and uses.
- Learning Objective 3: Use and operations issues and how to resolve them
- Learning Objective 4: To perform a drone demonstration in order to showcase it's capabilities.

DRONING ON ABOUT DRONING

Mention drones and we think of...



Historians say...

The first “drones” were balloons used by the Austrians in July 1849 to bomb the City of Venice

Scared people, but little impact on the outcome.

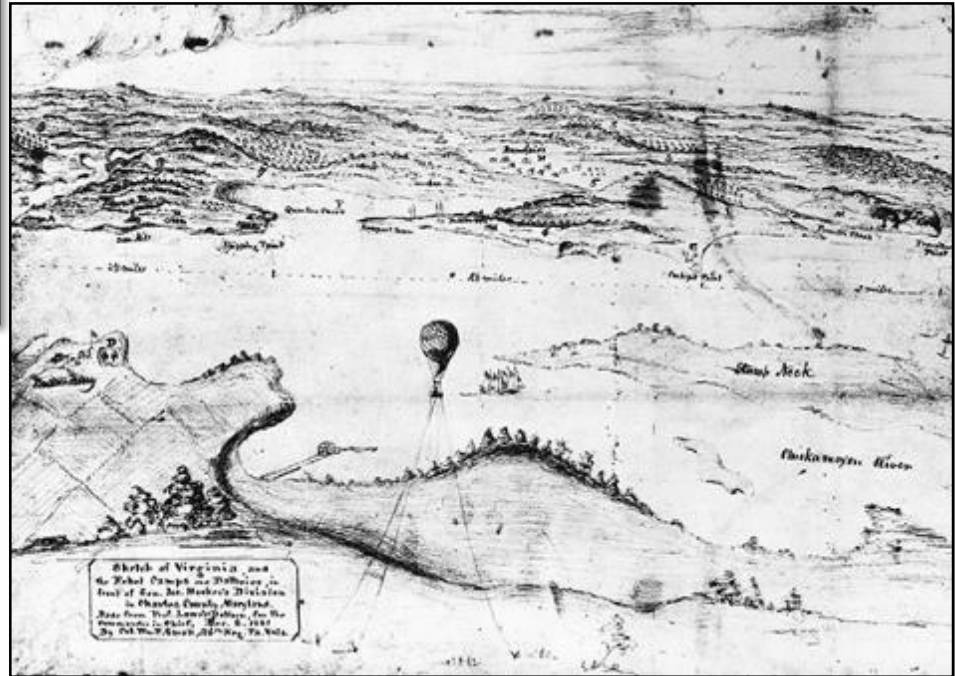


Confederate & Union Forces used balloons for reconnaissance missions

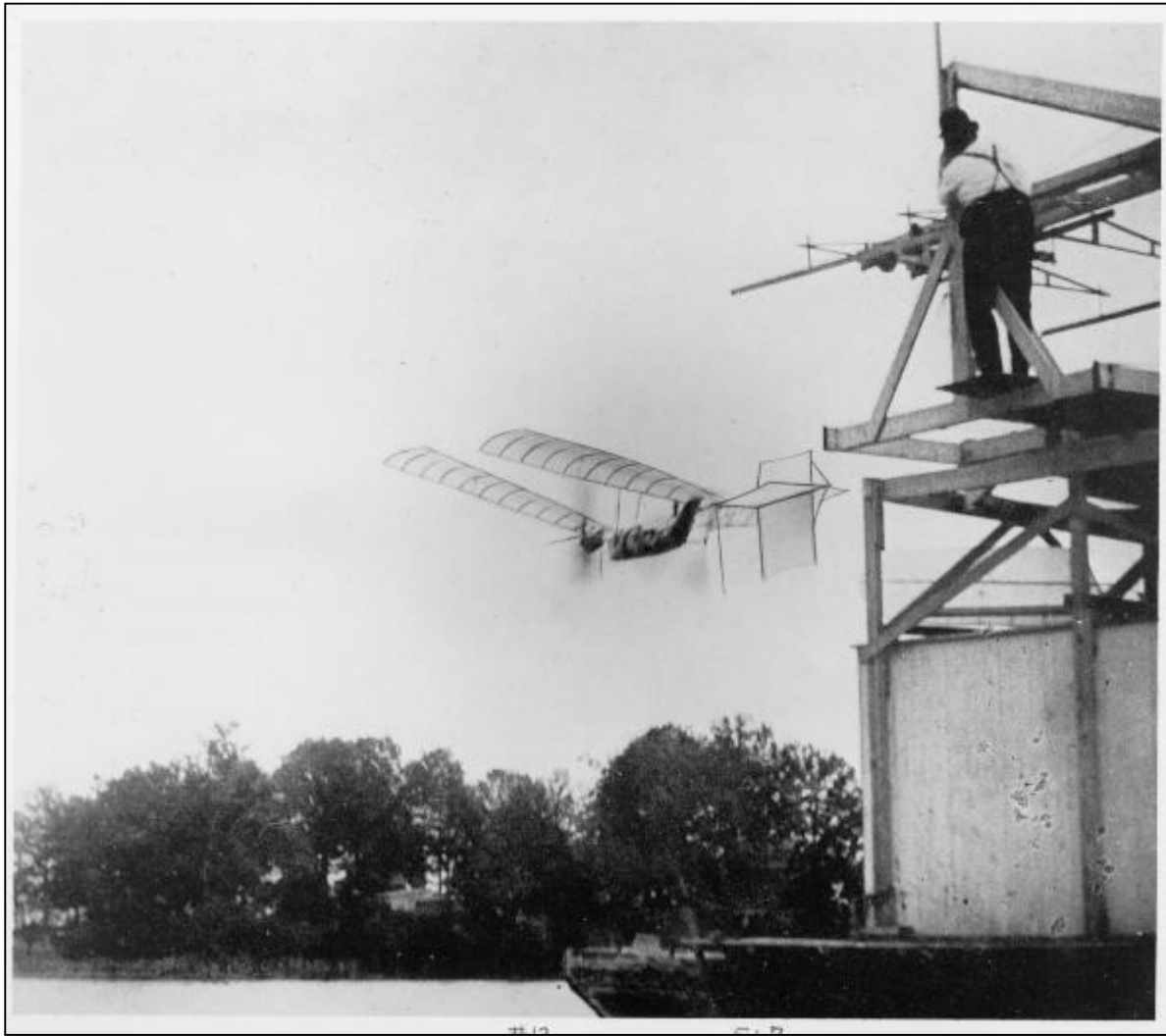


Thaddeus Lowe's Intrepid Balloon

Sketch developed of
Confederate Positions using
Lowe's balloon



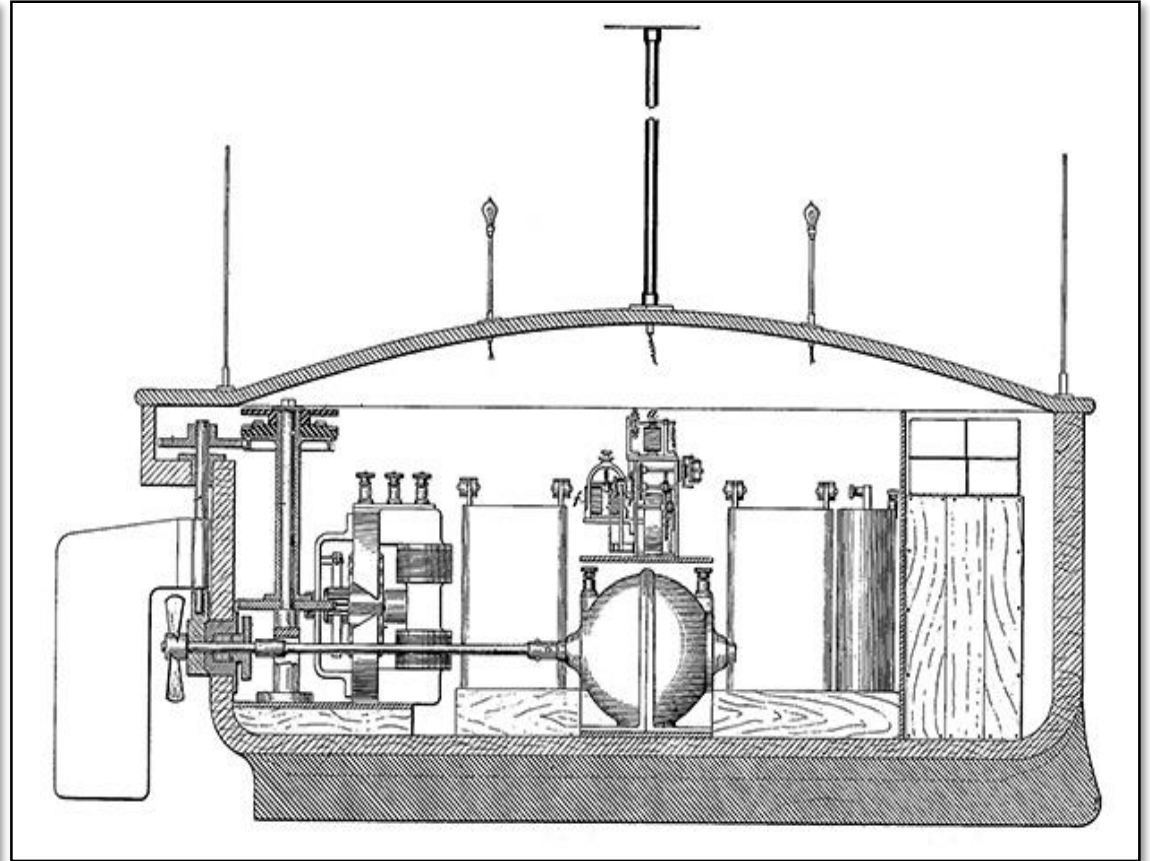
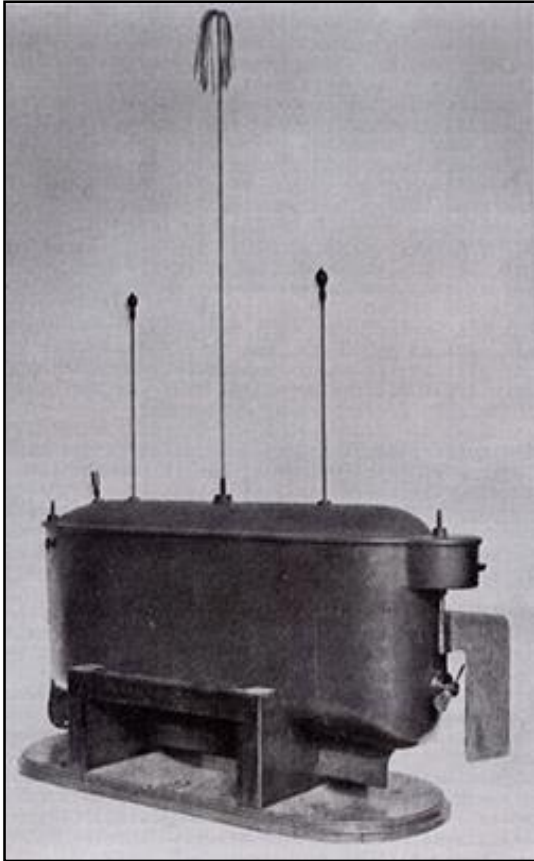
Samuel Langley built the 1st unpowered aircraft in 1896, which flew for approximately 90 seconds!



The military has led the way in drone technology

<u>EVOLUTION OF US DRONE WARFARE</u>	<u>Phase 1</u>	<u>Phase 2</u>	<u>Phase 3</u>	<u>Phase 4</u>	<u>Phase 5</u>
	The Target Drone	The Flying Bomb Drone	The Surveillance Drone	The Hunter-Killer Drone	The Police Drone
Time period	Early twentieth century	Interwar period	Cold War, particularly after the Cuban Missile Crisis	Post-September 11, 2001	Post-September 11, 2001
Institutions	U.S. Army	U.S. Air Force	U.S. Air Force and Strategic Command	U.S. Air Force, CIA and JSOC	Police forces, Customs and Border Patrol
Military logic	Drones were used as practice dummies	Drones were used to deliver ordinance across enemy lines	Drones were used to photograph denied or dangerous areas	Drones were used in a military "manhunt" during the war on terror	Drones are being used by police forces in the U.S and Europe
Key Geographies	Developed in UK and US military shooting ranges	Trialed across English Channel	Drones were used across North Vietnam, Cuba, China	Afghanistan (AF), Pakistan, Yemen and Somalia (CIA and JSOC)	Cities in the global North, used by hobbyists and criminals
Spatial Logic	-	Cross the Battlefield, Bomb the Nation State	Surveil the Battlespace, Capture photos	Hunt the Battlespace for dangerous individuals	Swarm the Street, protect VIP buildings
Iconic drones	Hewitt-Sperry Automatic Airplane, Kettering Torpedo	Glide Bomb, Modified B-17 bomber (Aphrodite)	Various Firebee drones, also known as Lightning Bugs	Predator, and later Reaper drone, also the hand-held Raven	Various quadcopter drones

The first remote controlled “drone” was a radio controlled boat built by Nikola Tesla in 1898



The development of flying drone technology

WWI:

- Elmer Sperry & Peter Hewitt's Hewitt-Sperry Automatic Airplane
 - 50 mile distance; carried a 300-lb bomb
- Dayton-Wright Airplane Company: Kettering Aerial Torpedo Bug
 - Pre-set controls which shut off engine after a pre-determined period; wings would release, and turned into 180-lb. bomb
- Dr. Wilhelm von Siemens: Siemens Torpedo Glider
 - Dropped from a Zeppelin; radio controlled

WWII:

- The Bat: Radio controlled glide bomb
- GB-1 Glide Bomb: Fitted with 1,000 – 2,000 lb. bombs; radio controlled; dropped from B-17 bombers
- GB-4 Glide Bomb: First TV guided bomb.

The development of drone technology

Cold War & Vietnam

- Ryan Aeronautical Company
 - Jet-powered surveillance drones launched from C-130 aircraft
 - Flew pre-programmed routes or were remote controlled
- In Vietnam, 1,000 Lightning Bugs flew over 34,000 surveillance missions
- 1970s: US Air Force launched the Compass Cope program to increase drone capabilities
- 1973: Philco-Ford Corporation developed laser designators used for weaponized Firebees



And finally, the culmination of military drones

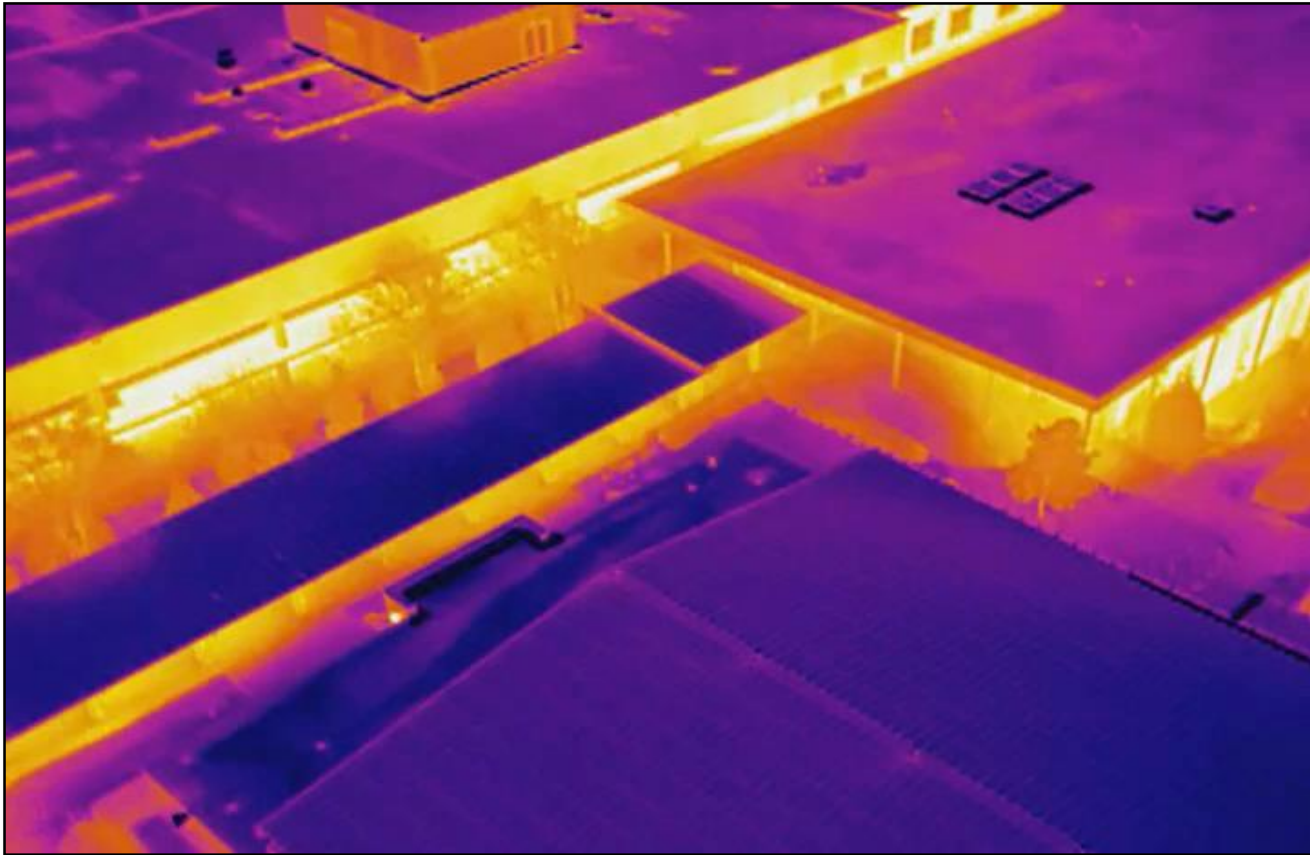
- Earlier models developed by Abraham Karem, called the Albatross
- Longer range than previous drones
- Mostly used for surveillance
- Weaponized after 9/11 & now known as the Predator drone



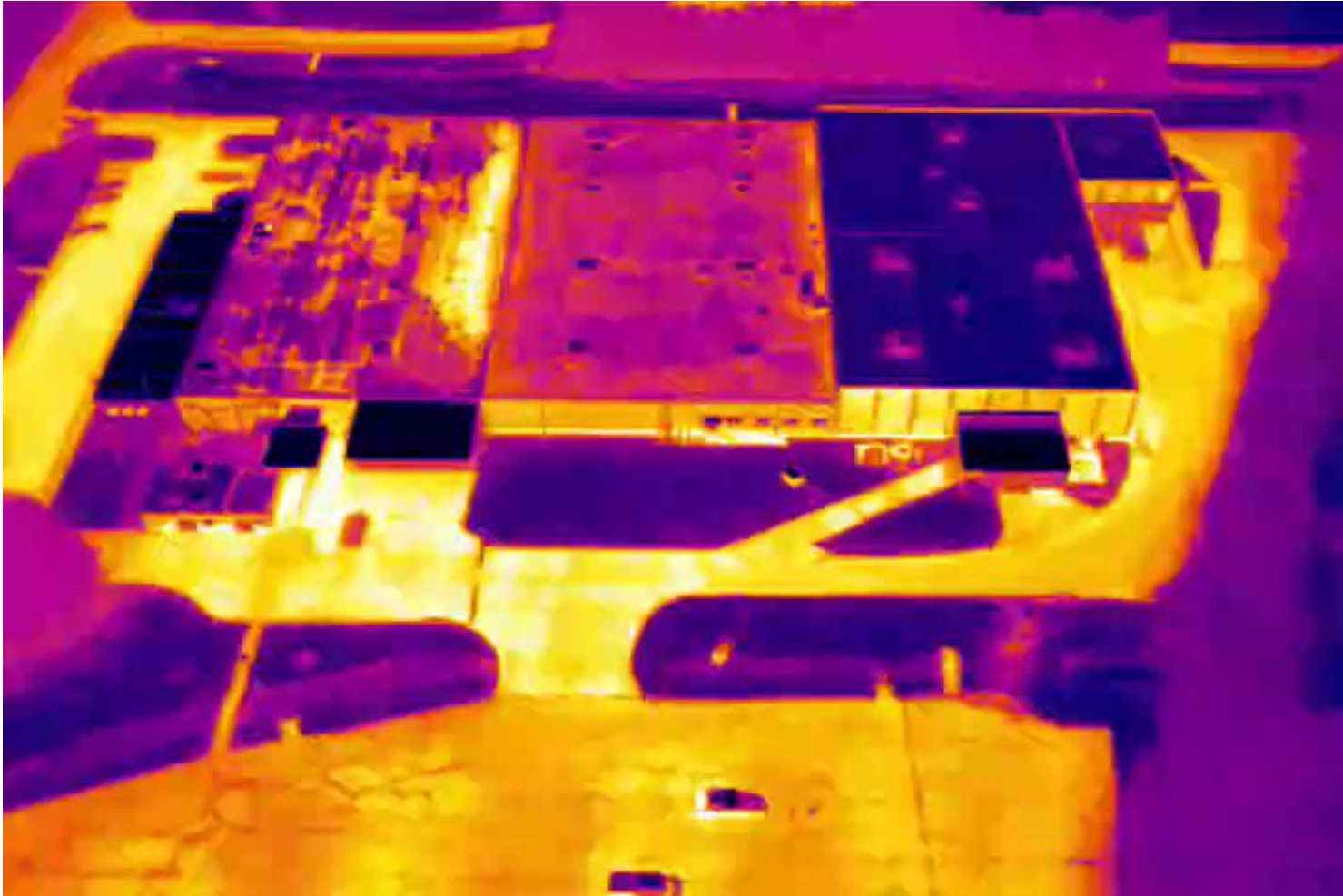
Other Drone Uses

- Police patrols/surveillance
- Traffic monitoring
- Land/utilities surveys
- Infrared roof surveys and building commissioning
- Documentation of construction activities
- Delivery of goods/services
- Crowd monitoring
- Toys
- Racing

Example of UAV usage for business



An example of drone capability for business



Examples of UAV usage for business

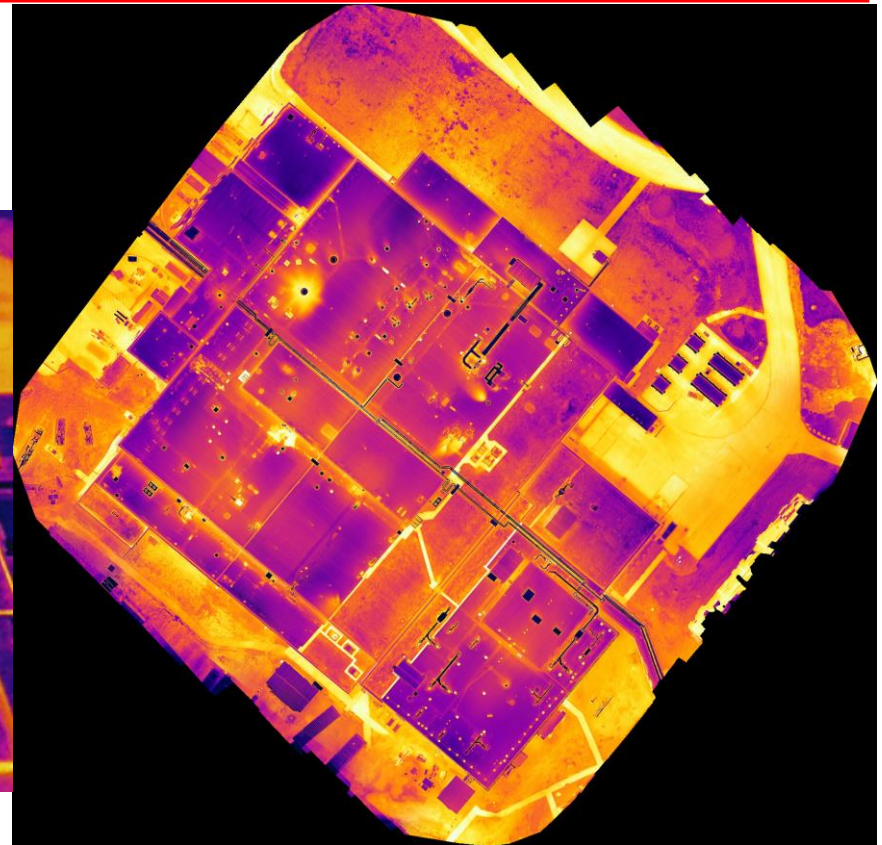
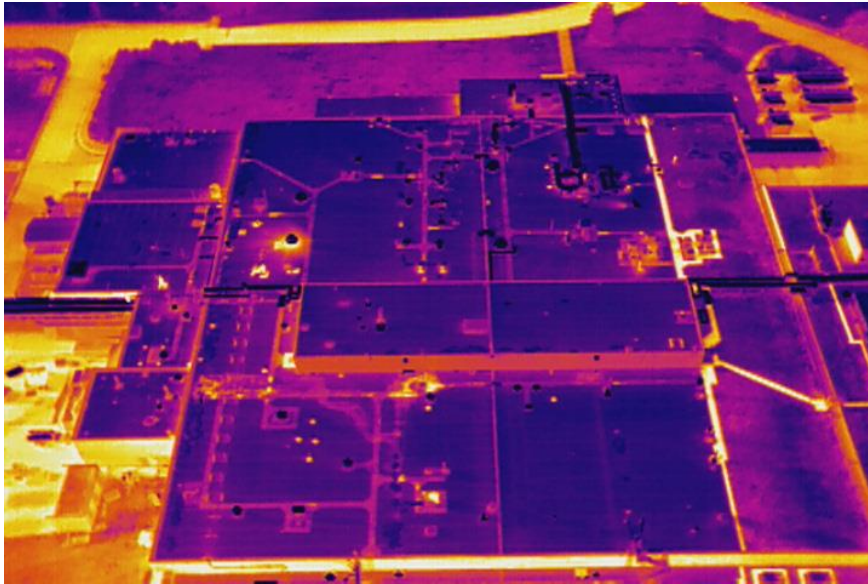


Quick visual assessments



Damage assessments

Example of UAV usage for business: Infrared Surveys using Photomosaic Imaging



Left side: Single Photo at 400'

Right side: Compilation of nearly 600 photos

Drone Operational Issues

Licensing requirements

- Licensed pilots can complete an application
- Unlicensed pilots usually take an online course and exam for licensing

Airport Restrictions

- Recreational operators are required to give notice for flights within five miles of an airport to **both** the airport operator and air traffic control tower, if the airport has a tower.
- Recreational operations are not permitted in Class B airspace around most major airports without specific air traffic permission and coordination.

Drone Operational Issues

Flight Operations

- Line of sight
- If operating a camera, may require two operators
- May take up to 90 days to get FAA approval for flights in airport restricted space
- Length of flights limited by batteries/fuel
- FAA rules/regulations for drones are still in the formative stages

DRONE DEMONSTRATION

This concludes The American Institute of Architects Continuing Education Systems Course

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