How Drones Will Affect The Oil & Gas Industry

NACE Houston

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MIDSTREAM INTEGRITY SERVICES

Overview

- Background – What is a Drone?
- Technology and Applications
- Challenges
- The Future
- Q & A

What is a Drone?

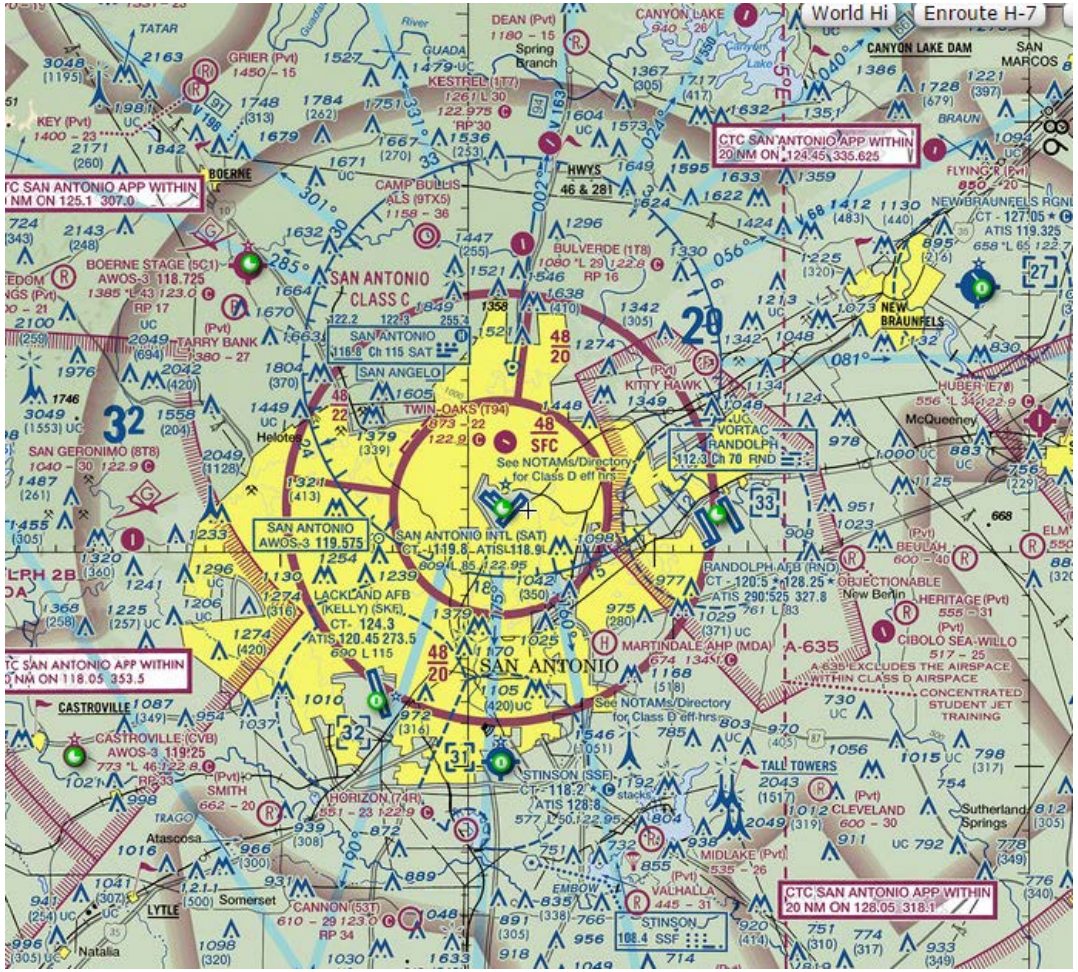
- Many names
  - Unmanned Aerial Vehicle (UAV)
  - Unmanned Aerial System (UAS)
  - Remotely Piloted Vehicle (RPV)
  - Remotely Operated Aerial Vehicle (ROAV)
- Many sizes
  - Micro-Drones
  - Prosumer Drones
  - Commercial Drones
  - Military Drones

Background

- Rapidly developing industry
  - Estimated $90B market
  - 100K jobs in next 10 years
- Highly regulated… for good reason

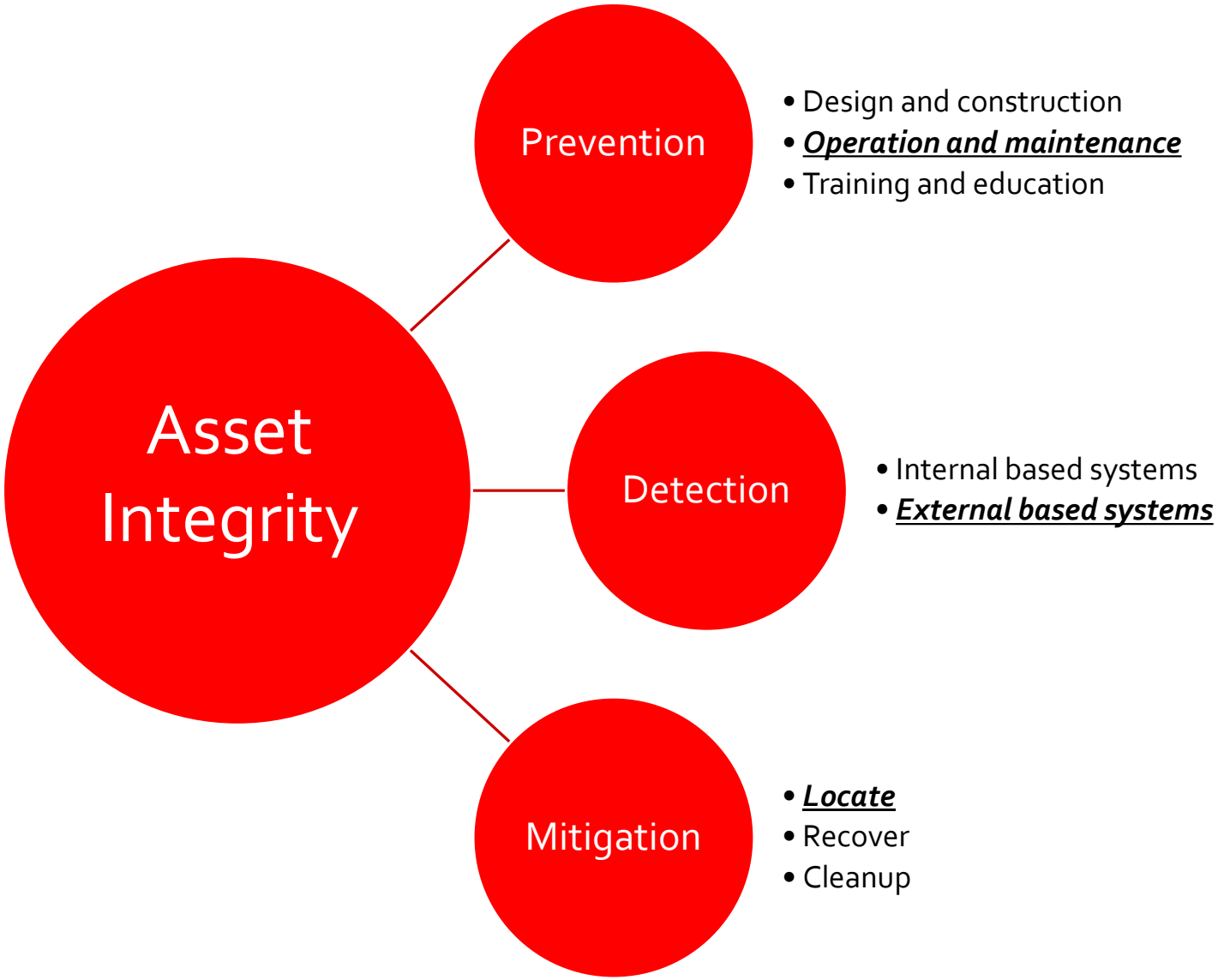
FAA Regulations

- Commercial use of drones illegal <u>UNLESS</u>:
  - Granted a "Section 333" exemption
  - Received a Certificate of Authorization (COA) for each flight
  - Operated by a pilot with an FAA issued airman certificate
    - Pilot's license is a requirement, currently no specific UAV training
  - Operated by a two man team
    - Pilot in command (PIC)
    - Visual observer (VO)
  - Less than 400' AGL
  - Within visual line of sight of PIC



Technology and Applications

Every operator's goal is improved safety with increased savings…



Technology and Applications

- Pipeline Patrol
  - Image analysis
  - Threat detection
  - Gas leak detection
- Cathodic Protection
- Vertical Structure Inspection
- Offshore Inspections
- Mapping
- Data Analytics

Pipeline Patrol – Image Analysis

- Vegetation health
- Soil erosion
- Encroachments
- Deviations from reference
- “Threats”

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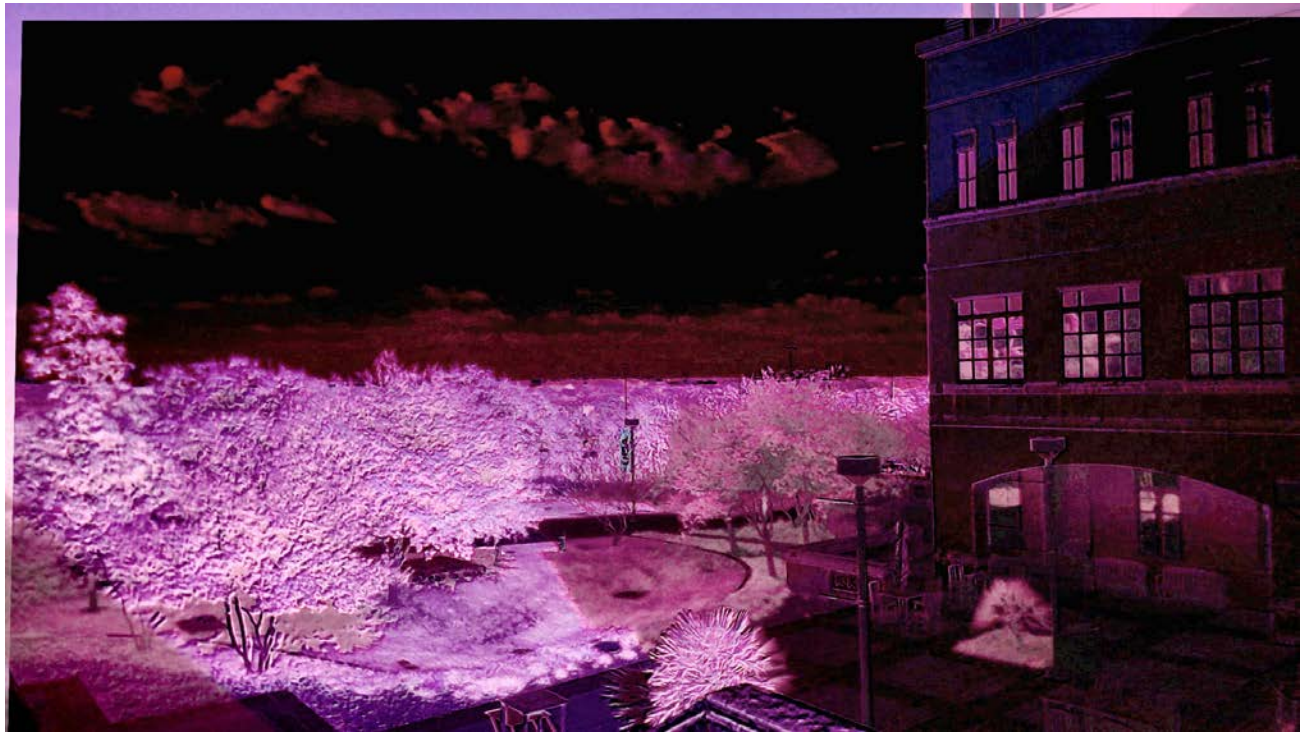

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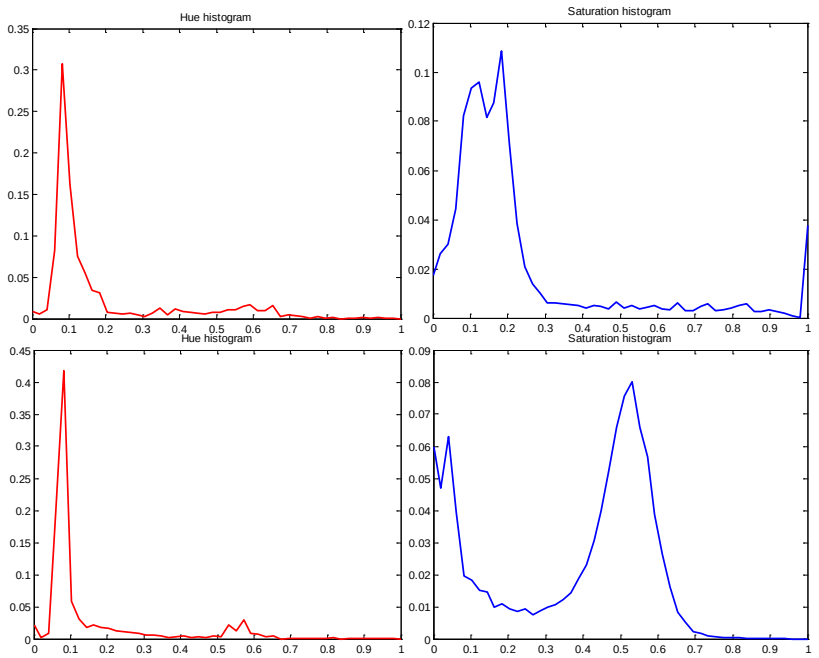

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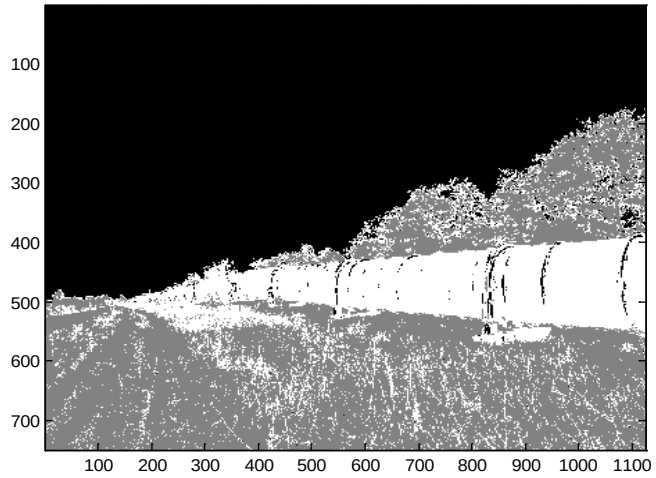
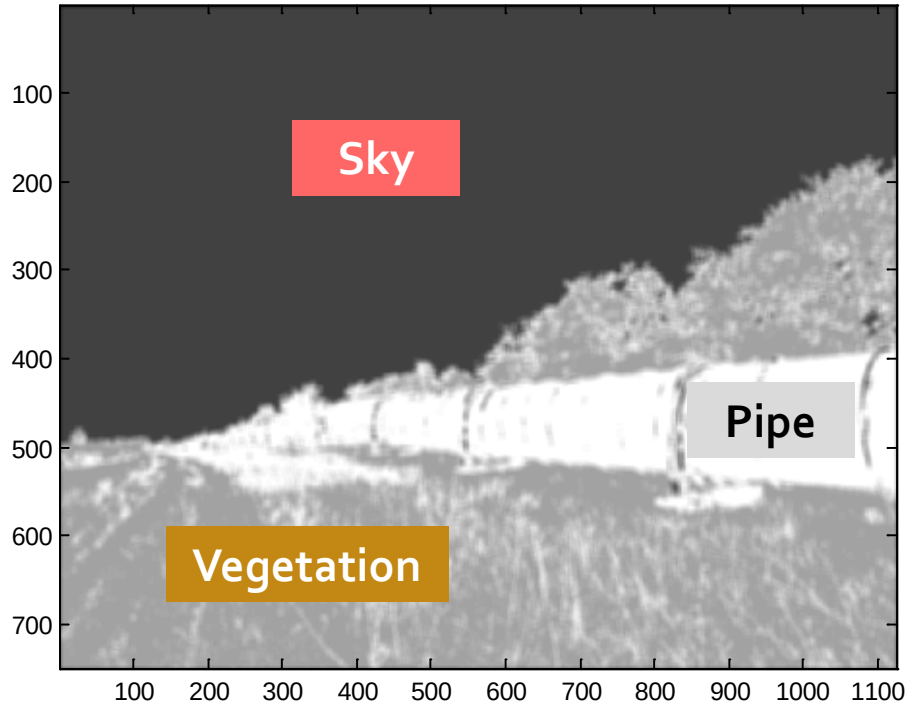
- Vegetation health
- Soil erosion
- Encroachments
- Deviations
- “Threats”

Segmented image using k-means



Application of a low-pass filter



Gas Detection

- Diff Absorption Laser
- IR Cameras

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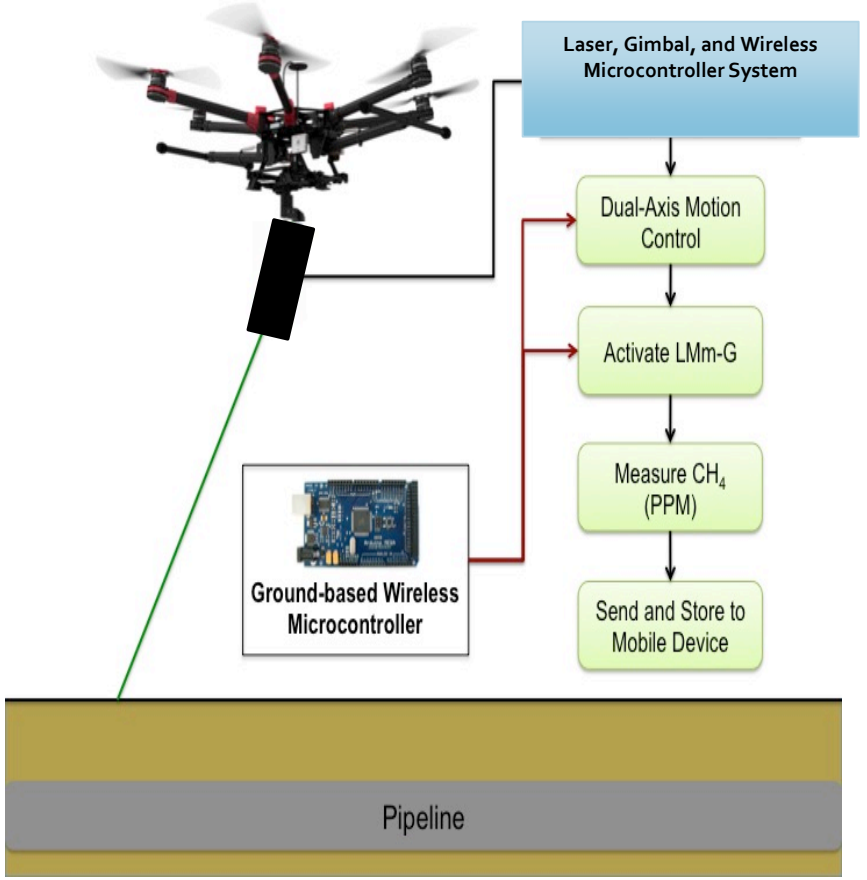
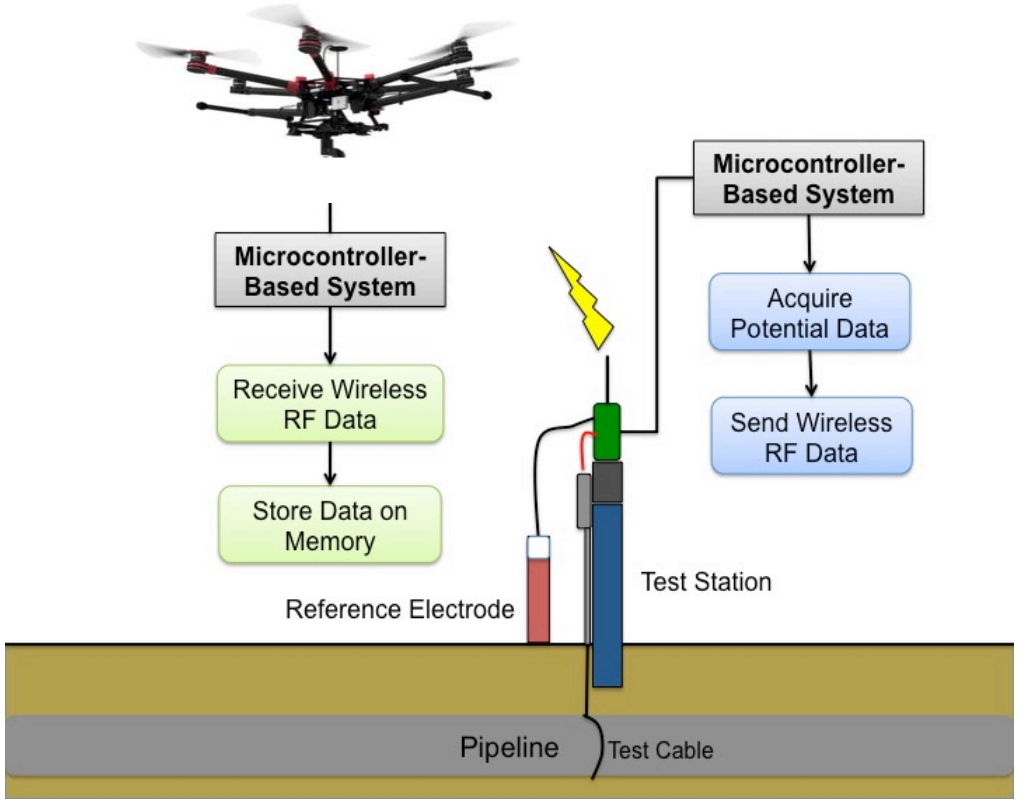


Cathodic Protection Data Collection

- Wireless transmission processing unit
- Recorded pipe-to-soil voltage readings

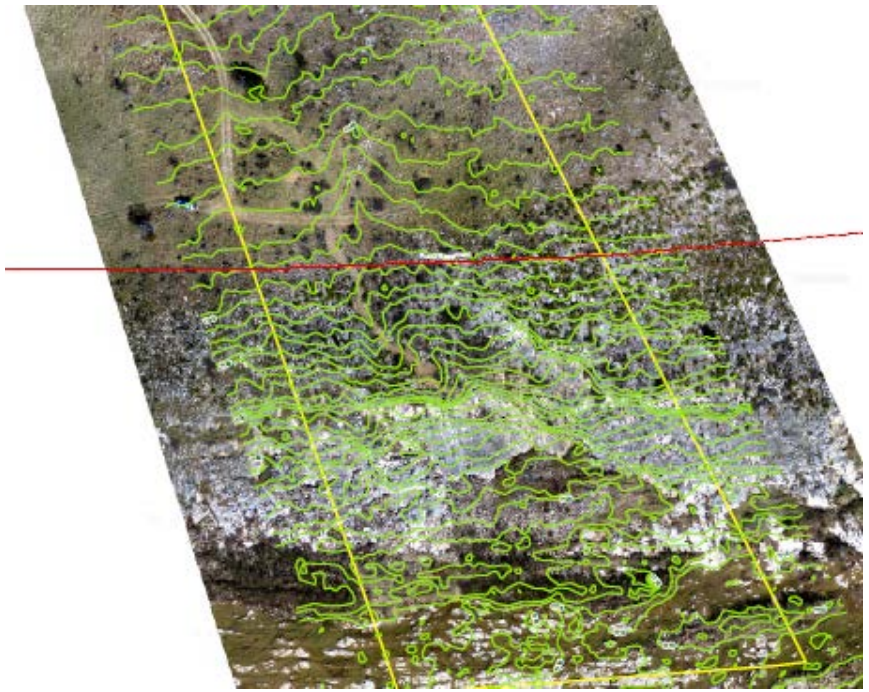


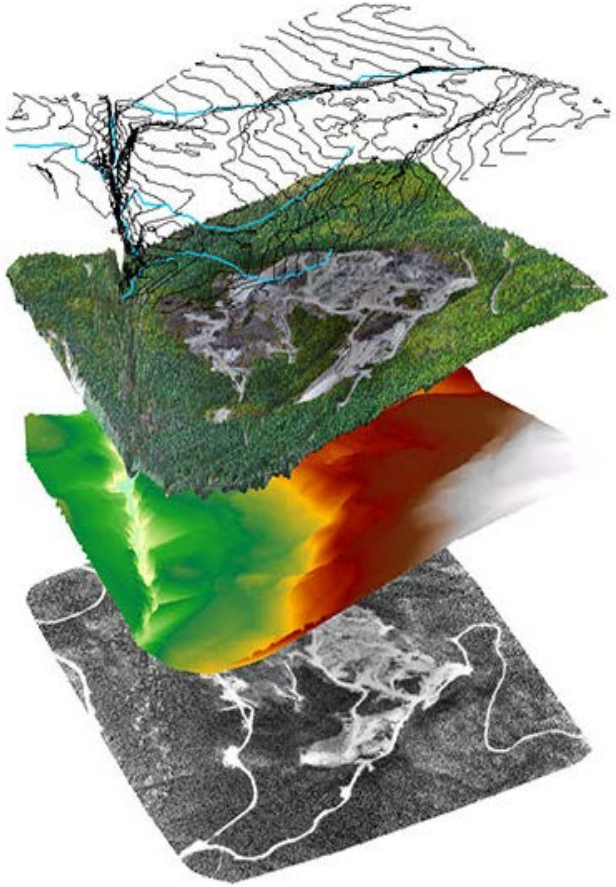
Structure Inspection

- Visual Inspection
- 3D digitizing
- Orthomosaics
- Identify hot spots
- Measurement accuracy

Mapping & Modeling

- 3D, 2D
- Topographic
- Spill Modeling





Mapping & Modeling

- 3D, 2D
- Topographic
- Spill Modeling

Current Challenges

We Are Here

Flight Time, Payload, and Distance

- Flight Time
  - Battery Powered – 10-18 minutes
  - Gas Powered – 2 Hours +
- Payload
  - Multirotor – 15 lbs
  - Fixed Wing – 5 lbs
  - Hybrid Multirotor – 20 lbs
- Distance
  - FAA regulations
  - Line of Sight Communications

Data Analytics

- Why Big Data?
  - Information from traditional sources
  - Information from new sources
  - Increased frequency
- Applications
  - Equipment maintenance
  - Production optimization
  - Safety and compliance

- Volumes of data increasing by a factor of 5 each year[1]
- Highest big data priorities[2]:
  - Develop near real time analytics – 62%
  - Expand data storage – 58%
  - Analyze increasing unstructured data – 53%
- Expected challenges to big data[2]
  - Managing data growth – 49%
  - Integrating disparate business tools – 41%

1. Brown, Brad, Jacques Bughin, Angela Hung Byers, Michael Chui, Richard Dobbs, and James Manyika. "Big Data: The Next Frontier for Innovation, Competition, and Productivity." McKinsey Global Institute, McKinsey & Co. May 2011.
2. Microsoft. "Global Enterprise Big Data Trends: 2013." September 2012.

Data Analytics

- Apply predictive analytics to big data
- Empirical methods of data mining also used to avoid conditions where pipeline corrosion accelerates
- Real time data leading to prediction provide environment to increase support for safety

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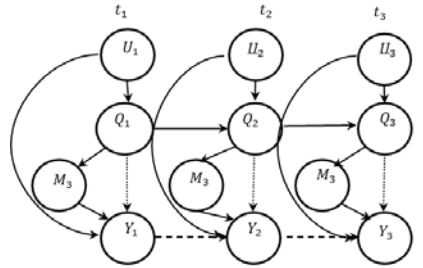
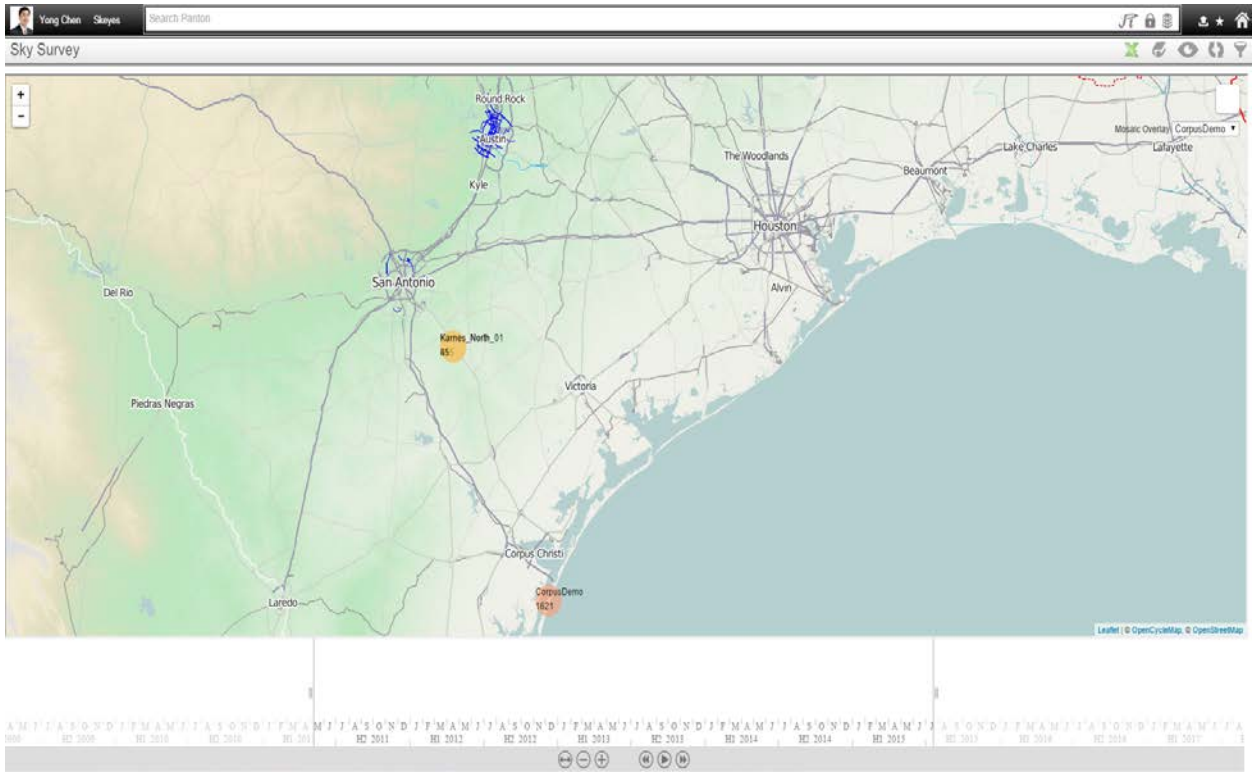
- Case Study - One meter, four variables
  - Pressure differential
  - Energy rate
  - Flow rate
  - Static pressure



- 100% on medium alert signals
- 57% on high alert signals
  - 100% precision

Data Analytics

- Business Intelligence
  - Use tools to find, select, and explore data in flexible ways
- Data storage and management
  - Capture and enable analysis of data
  - Server or cloud-based



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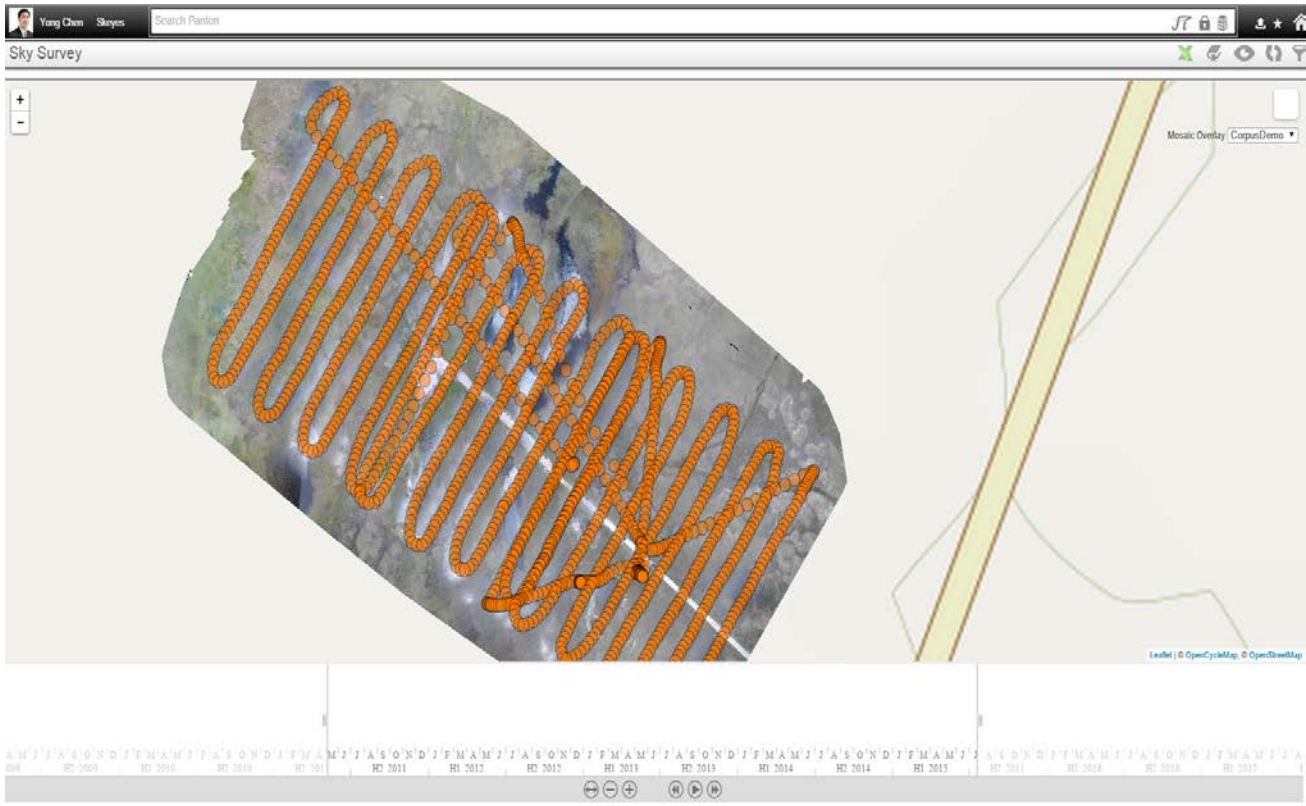

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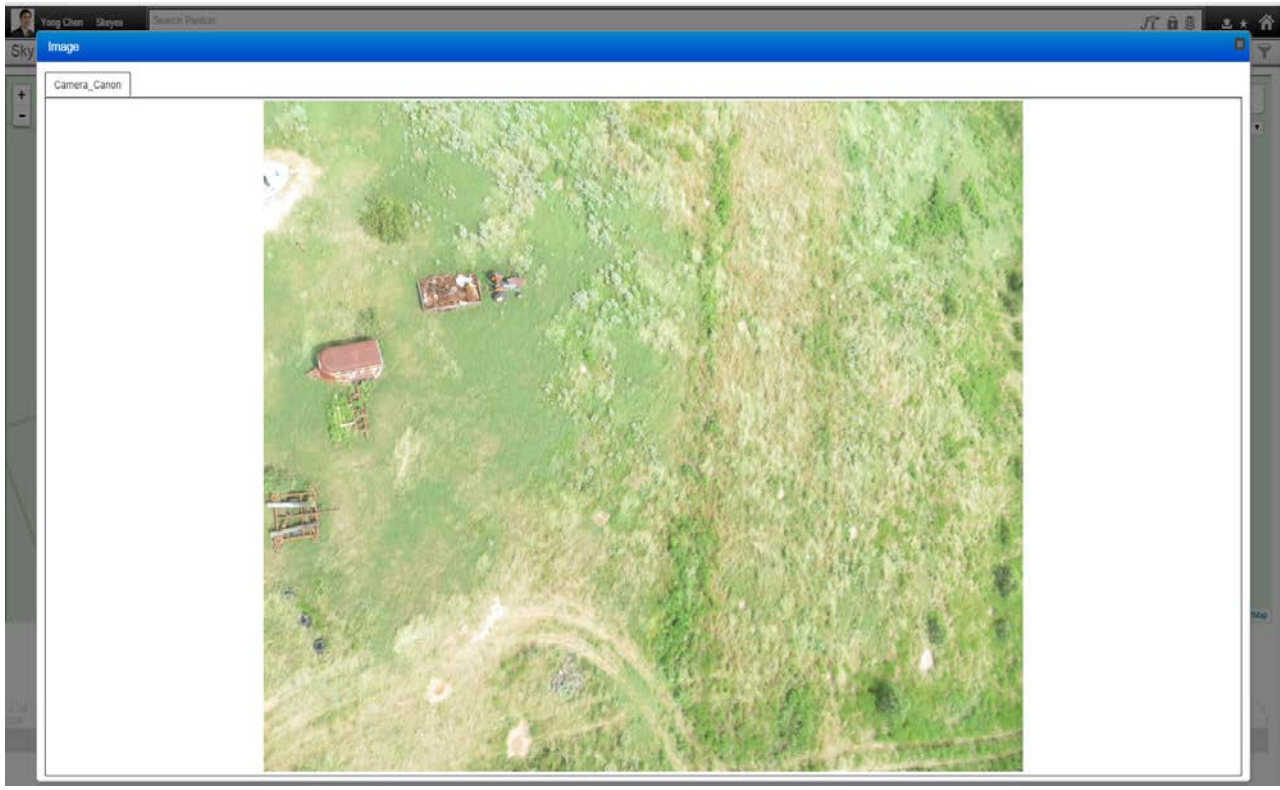

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Summary

TODAY

- Patrol
- Vertical structure and facilities inspections
- Gas detection
- Video imaging
- Mapping
- Pre-construction survey
- Phase 1 environmental survey

TOMORROW

- Data analysis platform
  - Searchable user interface
  - Map-based
  - Timeline oriented
- Automated image analysis and threat detection
  - Class location
  - HCAs
- CP data collection