

Small Unmanned Aerial Systems (sUAS) Applied to Traditional Inspections and Surveys

Description: Perform traditional gas pipeline inspections and surveys by incorporating the agility and positioning of sUAS mounted sensors
Status: Advanced development is ongoing with activities that include advancement of sUAS platforms for real time data collection and conditional assessment

BENEFITS

Advantages of using sUAS agility and positioning are recognized when integrating them into traditional gas inspections and survey strategies. Advantages within leak detection, emergency response, right-of-way management, infrastructure assessment, corrosion severity and distribution/transmission integrity management programs (DIMP/TIMP) have been tested and confirmed.

BACKGROUND

sUAS platforms continue to develop as well as the emergence of smaller, lighter weight and higher sensitivity sensors that are now available for practical pairing with these agile sUAS for consideration of routine and emergency inspections and surveys. Recognizing the value of the technique for the sUAS inspection and survey accessibility, it became evident to NYSEARCH fund that going beyond photographs would further enhance the sUAS capabilities by applying advanced sensors for various applications. All sUAS techniques are designed and performed within the FAA commercial sUAS regulations of Part 107.

TECHNICAL APPROACH

LEAK DETECTION

sUAS mounted sensors are positioned close to an inaccessible pipeline or other asset. A combination of remote methane leak detection and open path bloom detection combine for effective and rapid leak survey confirmation, refer to Figure 1.



Figure 1: Performing leak detection with a sUAS mounted methane sensors

Enhancements to sUAS’ leak detection techniques promise advancement in localizing the leak emission point on the ground, refer to Figure 2.

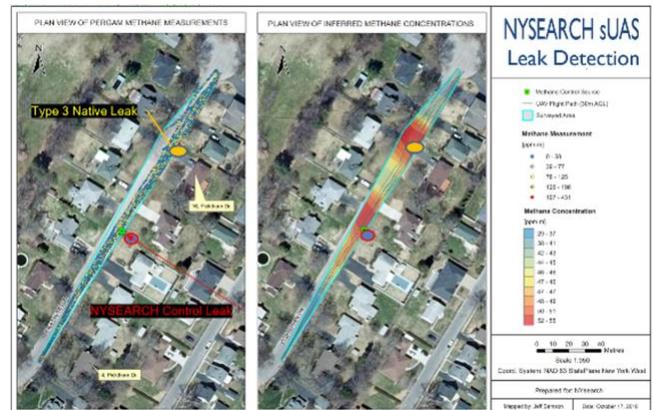


Figure 2: sUAS methane detection survey, red star indicating leak location.

EMERGENCY RESPONSE

Emergency hazards often prohibit personnel and

vehicles with limited or no access to perform inspections and surveys. sUAS techniques have been tested to replace “eyes” and “ears” with sensors to recognize, detect and pattern. Cameras and various sensors can be used to evaluate emerging and changing emergency conditions.

RIGHT-OF-WAY MANAGEMENT

During annual or conditional assessment for right-of-way management, sUAS techniques perform inspections much faster over great distances and over difficult to assess terrain. Incorporation of cameras, LiDar and patterning techniques enable annual reviews to recognize encroachment or damage and anticipate damage before it happens.

INFRASTRUCTURE ASSESSMENT

sUAS mounted with cameras and sensors provide the ability to perform up-close inspection on otherwise inaccessible pipe and pipe structures. Inspection of inaccessible pipeline was successfully completed by positioning the sUAS over 1,000 feet away next to the pipeline while an inspector viewed a monitor, refer to Figure 3.

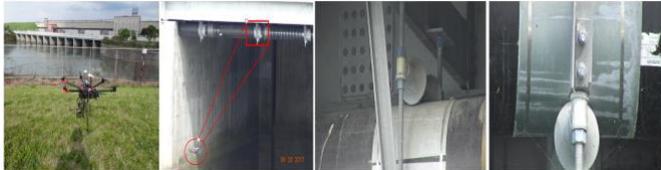


Figure 3: sUAS techniques perform pipeline inspection inaccessible to traditional technique

CORROSION SEVERITY

Difficult to detect and determine severity corrosion damage is readily performed with sUAS techniques. Advancements for measuring wall thickness are being considered, refer to Figure 4.



Figure 4: sUAS corrosion detection location results, GPS specific identification, pipe bridge 750 feet above a navigable waterway

DIMP/TIMP

Multiple combinations of these advanced sUAS

inspections and surveys provide more tangible in-depth information for making decisions within Distribution Integrity Management Programs (DIMP) and Transmission Integrity Management Programs (TIMP).

PROGRAM STATUS

NYSEARCH has developed, tested and brought to commercialization various sUAS inspection and survey techniques. Some gas companies have created internal groups to perform sUAS customization while other gas companies have contracted sUAS services.

NYSEARCH has multiple ongoing programs to improve sUAS technologies for localization of leaks, quantification of emissions, detection of leaks emitted from submerged pipelines, as well as corrosion detection and severity assessment.

Highlights

Applying sUAS based inspections and surveys provides:

- Access where inaccessible pipelines are located
- Advanced sensor capability for intended inspections
- Records for comparative repeated data collection

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