Solutions for Detecting and Measuring Methane Emissions in Landfill Environments

DRONES Plus ROBOTICS

Where Innovation Meets Expertise

About Us

Drones Plus Robotics – Frisco, TX

Providing Drone and Robotics solutions since 2015

Focused on serving the commercial drone and robotics industry

What brings us here?
To share how businesses in your industry are utilizing drones and robotics for Methane Detection and Reporting

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Aerial Sensors

- **Sniffers** (Soarability)

  - electrochemistry
  - photoionization detection (PID) (VOCs)
  - non-dispersive infrared (NDIR) (Hydrocarbons)
  - **TDLAS (CH4 Specific – High Resolution, Fast)**
    - Aerial and Robot based

- **TDLAS Cameras**

  - AiLF - U10
  - Pergam Laser Falcon
  - **HEQ/Purway CH4 Methane Detector**

- **OGI**

  - For active capture systems with compression sites.
    - Aerial and Handheld
    - New low-cost aerial OGI – methane only

- **Others…**

Deployment

- **Drones**
  - **DJI** (Functional, Economical, Political…)
  - Everybody else

- **Drone Docks**

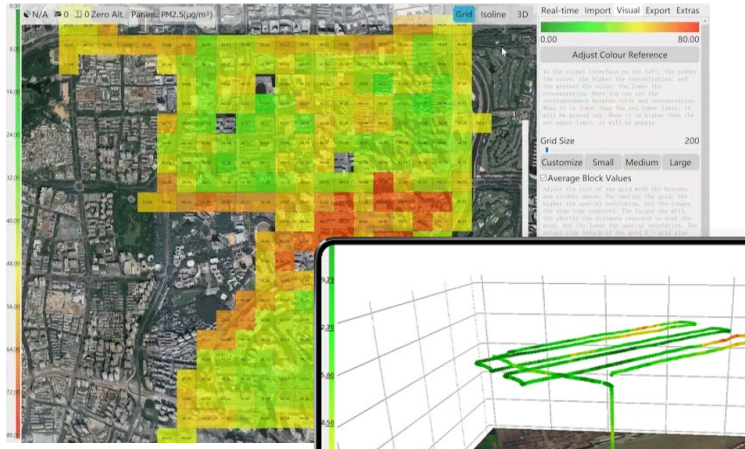
- **Robots; Quadruped and Humanoid**
  - Boston Dynamics Spot (IP54)
  - **Unitree B2 (IP67)**
  - Others…

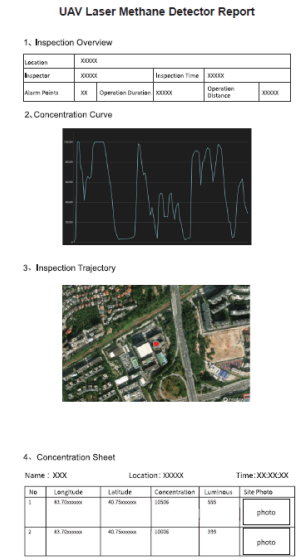
(Not a question of “if” but “when”)

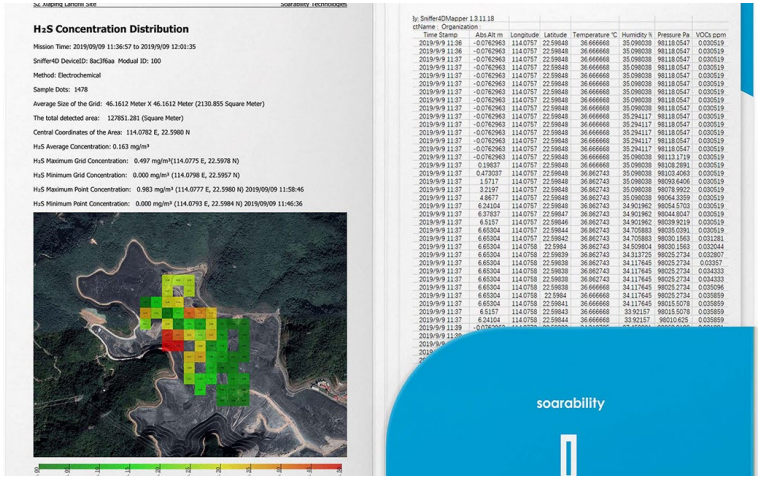
- **Aircraft/Helicopters/Satellites**… (Not my cup of tea)

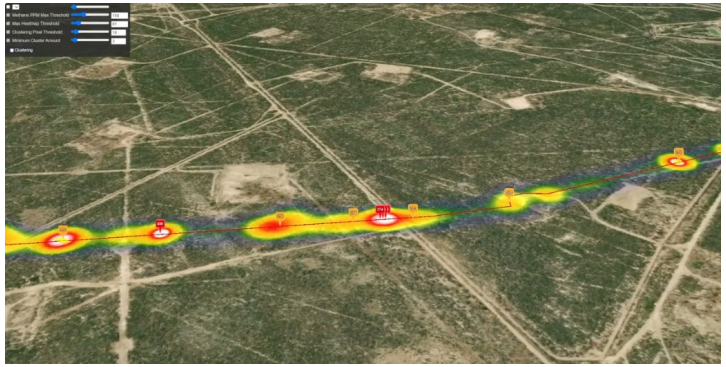
Reporting

- **Oil and Gas**
  - Asset Specific
  - Canned reporting works well
- **Landfills**
  - Geographical
  - Target Rich Environment
  - Canned Reporting not as effective









Selected Topics

1. How do you manage variable winds and other complex environmental conditions? *TDLAS is wind independent, but ground wind sensors can help with reporting. Robot based Sniffers are on the ground. Sniffer mounted Dock Drones can land and sample.*
2. How do you manage complicated terrain? *Generate a .dsm. Load the .dsm into the inspection mission.*
3. Is your resolution sufficient to distinguish between allowable emissions (working face) and those that are not allowed? *TDLAS can be too sensitive. You can get too much data.*
4. What are the similarities between advanced technologies applicable to detecting methane from landfills and those employed in the oil and natural gas production field? Are the significant differences that EPA should be aware of? *Landfills and O&G assets require different reporting and inspection techniques. Similar sensors but O&G requires a broader range of gasses.*
5. Can you please explain the financial feasibility of your technology for landfill emission monitoring? *Operators should consider outsourcing or potentially a hybrid model for continuous methane monitoring. The hardware investment is relatively small compared to the overall investment.*

Thank You

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