# SENSORS USED on DRONES for PIPELINE MONITORING

*A brief understanding from Airborne Drones on how to deploy sensors on UAVs for pipeline monitoring*

CAPE TOWN, SOUTH AFRICA, November 8, 2018 /EINPresswire.com/ -- SENSORS USED on DRONES for PIPELINE MONITORING
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INTRODUCTION

Oil pipelines are vast infrastructures often in difficult terrains such as marshlands, hot desserts or frozen areas, or even areas of conflict. The length of main pipelines in Russia exceeds 280 thousand kilometres while in America it exceeds 2,2million kilometres. And the world's economies depend on these critical supplies of energy.

The extent of this infrastructure makes it hard to identify leaks in advance to avoid damages that can result.

Pipelines get monitored against various parameters, such as pipeline pressure and temperature, diameter of a pipeline rapture, layout of pipelines and type of transported fluid, etc.

While pipeline operators must carry out regular inspections of their equipment to ensure it is in safe working order, restrictions in detection of hidden leaks may result in liquid hydrocarbons getting into the ground up to the water bearing-layer. Generally most leaks coincide with Methane Gas leaks.

PIPELINE MONITORING

Overview of Current Methods:

Physical Patrols: Leaks are difficult to detect visually, or by smell during physical patrols. Human inspections can only go so far as human access are often limited when it comes to heights or confined spaces. Inspections are contained to statistically sampled, pre-determined routes. This leaves large areas of pipeline un-inspected.

Pressure Control method: Small leaks are difficult to detect and has to be done by hand sensors.

Ultrasonic Flowmeters: Small leaks are difficult to detect and this method is expensive. This also requires immediate access to the the areas of pipeline under inspection.

Conductive Cables: This method is expensive, requiring high setup effort and direct access to all areas of pipeline to be monitored. Small leaks are also difficult to detect.

Helicopter or Plane: Flown manually the flight path is not exact and incurs the extra cost of a pilot. Flies higher and quicker and has to carry expensive thermal equipment which can therefor only spot larger gas leaks which only make up 30% of all gas leaks.

Earth Remote Sensing data (via satellites): provides low resolution images.

UAV-Based Sensor Payloads Used for Pipeline Monitoring.

Different high quality sensors aboard the unmanned aerial vehicle (UAV), allow inspecting of pipelines with respect to different criteria simultaneously.

Light weight UAVs provide for continuous scanning of a pipeline at long distances and in hard-to-reach areas, providing maximum safety at the same time. UAVs can routinely fly closer to the ground at night, follow a very precise flight path. They also have lower operational costs and are more environmentally friendly. Also, night time inspection has the additional advantages of being less intrusive on human settlements and as the night time air temperatures are more consistent, providing for more accurate readings.

Airborne Drones recommends that end users should identify the type of data that needs to be collected first, ie:
High resolution color imagery to identify: Damage to pipeline, Vegetation affecting pipeline
Multispectral imagery to identify: Monitoring pipeline right of way. Can be used in an agricultural space to detect plant health, but conversely it can be used to see the effect of pipe line on the ecosystem and identify gas leaks.
LiDAR to create 3D digital model: Due to the high accuracy of LiDAR models you can make 3D models (digital twins) of a pipeline and its relation to earlier versions to establish where the pipeline has shifted and predict and preempt possible damage.
Thermal: To identify possible defects
Using general wave cameras with RGB imagery and thermal overlay you can predict weaknesses in pipes and possible leaks and then send out inspection teams to measure if there is an actual leak or a bigger heat-shift reflecting structural failure.

In various combinations the above technologies can be used in the following methods:
Digital photogrammetry.
Spectrometric method.
Geothermal surveying method

The future.
Laser methane gas detection.

The Airborne Drones Vanguard can cover up to 45kms in a single flight, performing up to 10 flights per day. With its high payload capacity, high endurance and range, and capture a combination of thermal, high resolution RGB and laser gas readings of methane concentration at particular GPS marked points.

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