GasTutamen™

Remote Natural Gas Leak Detection

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Gas Leak Detection – A Challenging Problem

Gas transmission pipelines transport the natural gas to the business and residential communities. This supply of energy is often disrupted by gas pipeline leaks, resulting economic loss and environmental pollution. Detecting gas pipeline leaks is a challenging task. Gas emerges from pipelines almost instantaneously and dilutes rapidly downwind.

There are two major techniques used for gas pipeline leak detection: (1) active detection, which requires illuminating the scene with a radiation source such as a laser which is absorbed by the gas plume, and (2) passive detection which relies on radiative transfer resulted from the temperature difference that usually exists between the background and the methane (CH_4) plume. Active detection removes the constraint of thermal difference, but requires a laser and a scattering surface behind the gas for echo signals. While passive methods allow a long range of detection with a relatively simple thermal imaging device, these methods rely upon a thermal flux between the gas plume and the ground surface below it.

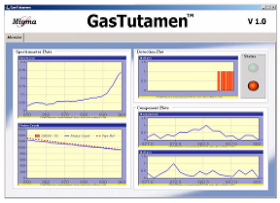
Remote Gas Leak Detection Using Sunlight

Since the existing active detection system is too expensive and passive detection system is less reliable, Migma has developed a system which utilizes *sunlight* during daytime to detect the methane, within 840 – 940 nm wavelength range. Being able to detect methane within this range is significant, which makes it possible to dramatically reduce the system cost associated with an expensive NIR spectrometer, an expensive laser device, and complex and costly system operations.

Unique Patented Technology

This gas leak detection product utilizes Migma's patented technology to reliably measure spectral absorbance during different time of a day under various weather conditions. This is achieved by applying a pattern matching technique using a set of normalized light intensity profiles estimated from the vacuum scanning. A low-pass filter, specifically designed for spectra data processing, can effectively remove the spectral measurement noises.

Since the spectral absorbance within 840-940 nm wavelength range is primarily dominated by the water vapor in the air, an enhanced ICA (Independent Component Analysis) method is used to decompose the spectral absorbance signal into a set of independent spectral signals representing the chemical components present in the air, which include H_2O, O_2, and CH_4 in case of gas leak. To detect and classify methane from these unmixed signals, unique features are extracted for further statistical pattern recognition, thus, achieving the methane detection and false alarm mitigation.



Product Specification

This system detects methane using an NIR spectrometer. It does NOT require any laser illumination of methane molecules in the outdoor environment. Instead, sunlight is used as the light source. This system works from early morning to late evening under various weather conditions (sunny, partly cloudy, cloudy, windy, etc.). Major features include:

Detection Sensitivity: < 5 ppm-m
Range: up to 410 ft
Response Time: < 1 second
Detection Technique: passive
Platform: mobile (vehicle speed up to 70 mph) or stationary
Data Logging: SQL

For more information, feel free to contact us:

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