

# Summer Internship/Master's project

## Gas Leak Detection

### Synopsis

The goal of this project is to use data from cheap sensors and machine learning to identify leaks that occur during the extraction and transportation of natural gas. Such leaks can decrease the air quality in an affected area and potentially pose a safety hazard. Detecting them reliably currently relies on large numbers of expensive sensors, which are costly to acquire, deploy, and maintain. Instead, an array of cheap sensor may provide sufficient information to jointly identify whether any leaks have occurred and where.

Reliable detection of such leaks is important as they have negative effects when left unattended on one hand, but require deployment of personnel to remote locations at great expense to fix the problem on the other. In particular, false positives should be minimized. A hardware platform for such sensors is available and will be deployed in the field to gather data that can be used in a machine learning approach to tackle this problem. Your task will be to implement a machine learning framework that takes such data as input and predicts whether and where leaks have occurred.

You will

- survey the literature to identify suitable existing approaches to perform this task;
- train a machine learning system to predict whether a leak has occurred based on sensor inputs;
- deploy this system and evaluate its performance on real data from the sensors deployed in the field.

### What you should bring to the project

You should be self-motivated and able to work independently, have strong programming and analytical skills, basic machine learning knowledge, and ideally some experience with one-class classification or outlier detection. Experience with a Linux environment and using large-scale computational resources such as Teton is not required, but a plus.

### What you will get out of it

You will become familiar with state-of-the-art methods in machine learning and hone your data science skills on a real-world project. Such experience is highly sought-after in industry. Depending on the obtained results, this project may lead to a scientific publication. This is a project with lots of details to be defined as part of it – you can bring in your own ideas and make it your own.

Interested? Talk to Lars Kotthoff <larsko@uwyo.edu>. Supported by a grant from Jonah Energy; joint project with Shane Murphy (Atmospheric Science).