

Problem or idea description

SmartMethane is a site with deep learning embedded in it that detects explosive substances in the air, combustibles that lead to malfunctions and accidents. First of all, our goal is to ensure that harmful gas does not fall into the environment, eliminate the release of toxic substances that leads to poisoning of people and determine in advance the presence of methane in mines to prevent explosions. It helps to make predictions about future events. General description of implementing of our idea:

- Early warning system: The system can detect even small amounts of methane and provide an early warning to mine workers, allowing them to evacuate before an explosion occurs.
- Compliance with regulations: The system can help mines comply with regulations related to methane levels and explosion prevention.
- Cost savings: By preventing explosions, the system can help mines save money on damage repairs and lost productivity.
- Historical data analysis: The system can store data on methane levels over time, allowing for analysis of trends and patterns to inform future safety measures.

Background information on the problem or idea

How did the idea originate? Nowadays, even in the era of digitalization, safety engineering in enterprises such as a mine, an oil platform, a thermal power plant has remained outside the public eye. The common problem linking them is gas, which, if released in excess, leads to adverse consequences: explosions. For example, the event that occurred in 2013 at Kashagan, in the Caspian Sea, demonstrates the environmental impact of the dangerous substance. "However, the attempt to start production in 2013 was unsuccessful - the pipelines between the islands where oil production was planned and the oil refinery on land began to crumble and crack almost before our eyes. The pipes simply could not withstand the aggressive carbon dioxide hydrogen sulfide from the field." - reports the Azattyk Rukhi news portal.

Available solutions with links

What solution can our platform offer? In solving mentioned early problem, we will rely on the following sources: We will develop a system of:

- sensors that will be able to detect the presence of methane in the air. The sensors will be connected to a central monitoring system that will allow for the real-time monitoring of the methane levels in the mine. [click here](#)
- filters that will be able to filter out the harmful gases before they are released into the atmosphere. [click here](#)
- ventilation that will be able to reduce the amount of methane in the air. [click here](#)
- alarms that will be able to alert the miners in case of a dangerous level of methane. [click here](#)

How to get the data?

Detection of methane in the air in mines can be performed using a methane sensor. These sensors can produce an electrical signal corresponding to the concentration of methane in the air. We will use a microcontroller such as an Arduino or Raspberry Pi to read sensor data and send it to a computer for processing. Our model will be trained on this dataset from Kaggle: [Proximity Analysis | Kaggle](#).

Brief description of your solution

The interface of our site helps us to easily enter the data and get the information we need. The algorithm is as follows:

- By analyzing the data, deep learning can accurately identify the presence of toxic gases in the air, allowing for more effective monitoring and regulation of air quality;
- To build a robust deep learning model for methane detection in mines, we will use more sophisticated model architectures such as CNN, RNN;
- Compare the absorption to a threshold value: The absorption measurement is compared to a threshold value that represents the minimum level of methane that is considered dangerous.

Tech stack that will be used

To create a SmartMethane site with embedded artificial intelligence we used:

- Deep learning libraries: Keras, Tensor Flow, Pandas, NumPy;
- Python programming language to write the algorithm for deep learning.

Any information you find necessary

The system recognizes people without a mask or respirator, helmet, gloves, protective suit, fixes the intruder in the photo and gives a signal. Using the Internet of Things, the system can detect that a person has fallen and stop the car next to him or detect people in dangerous areas if they are standing too close or on the wrong side.

Artificial intelligence technologies are used to coordinate various business processes and subsystems in order to reduce the number of staff errors, reduce downtime, create an optimal plan for performing tasks by employees and move equipment to ensure safety in the enterprise.

According to the monitoring of occupational injuries, 67.8% of all accidents are caused by the human factor. The accuracy of recognition of violations is 95% and allows you to fix the absence of a helmet, goggles, mask or vest. The use of this technology has reduced the number of days of disability for employees by an average of five per year.