# METHANE DETECTING SYSTEM

Mr. Jitendra Gupta, Dept. of Information Technology

Dr. C.V. Raman University, Bilaspur

## Abstract

This paper describes the creation of a mini-smart methane sensor scheme to be used as a sensing node in underground coal mines to ensure a safe working environment. Machine-mounted methane monitors should be used during mining to monitor continually methane concentrations. Sensor offset, noise, temperature and aging drift often corrupt the weak output signal from the Wheatstone bridge circuit.

**Key words**: methane detection, methane sensor.

## Introduction

The mini methane detection system embedded in a miner's cap lamp and worn on a miner's helmet can provide an alarm signal continually whenever methane concentrations exceed the specified level at the miner's location. When methane concentration[1] is excessive, it is intended to send visual and/or aural alarm signals. This is a significant advancement of methane surveillance technology[2] as it changes the traditional alarming system to prevent artificial factor influence. This technique of methane detection is used to create multi-point distribution alarm and can facilitate the construction of networked environmental monitoring and alarming systems.
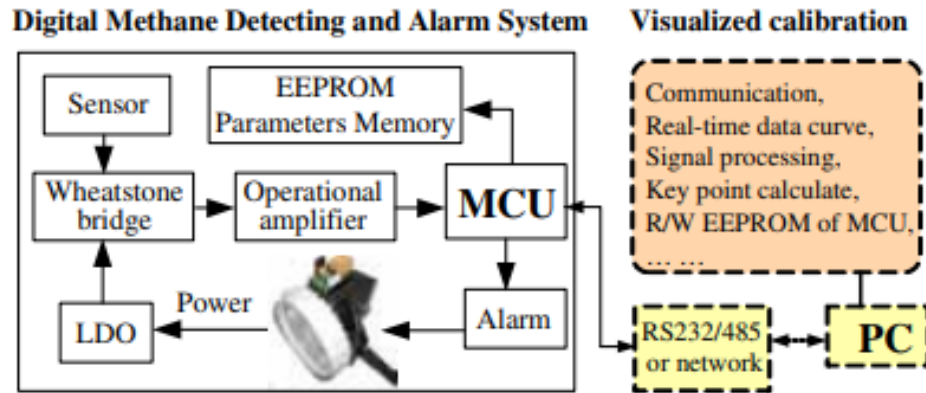
## Methodology

Fig.1. Principle diagram of methane detecting system

A mini-smart methane detection and alarm system was created for MCU based on miners ' lamp[3]. Figure 1 shows the system's main diagram. The smart methane sensor has the interface to host serial communication or network computers to perform automation and sensor calibration visualization.

The MC114 is linked to a Wheatstone bridge circuit[4] by a commercial heating catalytic methane sensor. An operational amplifier processes the magnified signal voltage with A / D Converter and processes it with ATMega48V. Compared to the continuous reference value in EEPROM, the digital value is compared. If the workplace's methane concentration exceeds the limit concentration, the MCU will offer a switch signal to alarm the miner using the methane detection and alarm lamp through its digital I / O ports. Through two interfaces, the MCU communicates with the outside: linear or network to PC, and nRF2401-based wireless sensor network.

**Conclusion**

It is therefore observed that, some issues with the methane detection system are based on the combustion-type component's catalytic heat, such as frequent calibration. The alternatives are as follows:

- Hardware circuit measures to decrease the impact of drift, noise, etc.
- Digital methane detection to perform automatic sensor system correction and nonlinear sensitivity compensation.
- The concentration of oxygen to detect methane precisely.

## References

[1]     F. Keppler, J. T. G. Hamilton, M. Braß, and T. Röckmann, "Methane emissions from terrestrial plants under aerobic conditions," *Nature*, 2006.

[2]     Z. Pokryszka, A. Charmoille, and G. Bentivegna, "Development of methods for gaseous phase geochemical monitoring on the surface and in the intermediate overburden strata of geological CO2 storage sites," *Oil Gas Sci. Technol.*, 2010.

[3]     G. S. Jaramillo, "Miners' lamp: Memory and the underground through a light installation on Bonsall Moor," *Cult. Geogr.*, 2016.

[4]     AspenCore, "Wheatstone Bridge Circuit and Theory of Operation," *Electronics Tutorials*, 2016. .