

Ideation Phase Literature Survey

Date	19 September 2022
Team ID	PNT2022TMID42645
Project Name	Project – Hazardous Area Monitoring in Industrial Plants

1.Rahmawati, H Rahmawati, D Arengga, FM Ramadhan, F Al-qodri, T Matsumoto, A Fujiyama, I Rachman (2021) “Gas monitoring station in hazardous environment with gases containing - S Sendari, Y

Abstract

Landfill sites collect tons of municipal solid waste (MSW) using an open dump mechanism, causing gases to emerge, which may cause disease and the greenhouse effect. Mainly, landfill environments are observed using a portable system that does not continuously monitor and measure emitted gas levels. It is also difficult to evaluate changes in landfill emissions over the long term unless they are monitored at regular intervals according to a detailed plan. This paper presents a new monitoring method to measure gas levels in landfill sites, which documents dynamic changes in gas composition concentrations over the long term. The system was placed in the middle area of the landfill and was charged using solar panels for convenience and greater efficiency during monitoring. While the instruments that are currently available are used for a specific parameter, this system can measure eight parameters, i.e., ambient concentration of methane (CH₄), carbon dioxide (CO₂), carbon monoxide (CO), temperature, humidity, wind direction, wind speed, and voltage level. The system was evaluated regarding its ability to monitor gas parameters continuously.

2.Zaini Zaini, Taffany Hudalil Alvy - Andalas (2022) “Design of Monitoring System for Hazardous Gas and Fire Detection In Building Based On Internet of Things” - Journal of Electrical and Electronic Engineering Technology 2 (1), 13-20, 2022

Abstract

Fires and gas leaks are events that still occur frequently. This incident is usually caused by various factors including leakage of LPG gas cylinders, cigarette butts that are disposed of

carelessly, short circuits of electric current and so on. Generally, fires and gas leaks can only be detected if the fire has already grown or a lot of smoke comes out of the building. Therefore, a monitoring system for detecting dangerous gases and fires in buildings based on the Internet of Things was created that can monitor the condition of the building through a website as well as send notifications to the Telegram application on smartphones. The detection system implemented uses a flame sensor as a fire detector, an MQ-2 gas sensor as a detector of hazardous gases (CO, CO₂, and CH₄), and NodeMCU as a module to transmit data. The system will work continuously in real time, if gas is detected that exceeds the threshold or a fire is detected, the system will send a notification to Telegram and the website will display the value and status of the sensor and a map of the area where the fire or gas leak occurred. The results of the detection system created to be able to provide solutions so that cases of fire and gas leaks can be handled early by detecting signs of fire or gas leaks and sending the information to users via the website and notifications.

3.Dirman Hanafi (2019) “Tele Measurement and Recording of CO Concentration, Temperature and Humidity for Hazardous Area - - Journal of Tomography System and Sensor Application 2.

Abstract

The hazardous area is an area that is very dangerous for humans to enter. Besides, the area should be monitored and controlled. This paper is only devoted to the types of hazards caused by carbon monoxide (CO) gas, temperature and humidity. For this aim, in this paper a tele measurement and monitoring system has been design and fabricated. This system able to measure and send the data to terminal point or monitoring point wirelessly. This system is equipped with three sensors for measuring the three parameters which indicate dangerous conditions of an area. There are the concentration of CO gas, temperature and humidity which are measured using a CO sensor, a temperature sensor and a humidity sensor respectively. The recorded data in the measuring terminal will send to the monitoring terminal using Radio Frequency (RF) communication system. For visualization of the recorded data, the Graphical User Interface (GUI) is developed. Based on the experimental test, the developed system is functioning well and able to perform the tele measurement process for CO concentration, moisture and temperature.

4.Mrs Yuvarani, D Kiruthika, J Rabitha, M Sarany (2021) “Integration of wireless sensor network with virtual Instrumentation In Hazardous environment” a - Int. J. of Aquatic Science 12 (3), 759-767.

Abstract

This paper was explained hazardous environment monitoring and management for observing details regarding protection and security, utilizing Wireless Sensor Network (WSN) techniques with using virtual instrumentation, the architecture of arrangements and conception implementation were explained in the circumstances of an industrial protection monitoring situation. Data acquisition performed via the deployed wireless sensor network with a clear cut on four parameters which are fire, humidity, temperature, and gas discharge. The data enter, observing, and control performance are understand from virtual instrumentation techniques. This also provide an easy-to-use user network and the convenience of data through standards-based web server techniques

5.Aditya Juganda (2020) “Evaluation of point-based methane monitoring and proximity detection for methane explosive zones in longwall faces of underground coal mines”

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ABSTRACT

Longwall face ignitions from accumulated methane gas are known to be among the most common causes of methane explosions at underground coal operations. Current industry practice relies on point-type methane sensors reading installed on the shearer body and other fixed location, such as the tailgate drive, to prevent face ignition in the longwall face area. However, this practice is not reliable in detecting and preventing explosion hazard in the longwall face, as shown by numerous face ignition cases, including the 2010 Upper Big Branch mine explosion in West Virginia, U.S. Computational Fluid Dynamics (CFD) can be used to simulate ventilation conditions in the longwall face for different ventilation scenario.

This approach has the advantages of allowing visualization of the aerodynamics of airflow and formation of hazardous gas mixtures which are not detectable using traditional monitoring and ventilation survey methods, which can be used to develop a more reliable methane monitoring practices to improve methane explosion safety in longwall coal mines. CFD modeling results show that the current regulatory requirements and industry practice of maintaining a minimum amount of airflow at the tailgate corner in combination with methane reading from two single point-based sensors installed on the shearer body and tailgate drive is not adequate to warn of and prevent methane ignition hazards at the face. This research has demonstrated that the proposed multi-sensor warning system that relies on multiple sensors reading installed on the tip of the shield's roof provides a more reliable and more accurate representation of potential explosive methane concentrations around the shearer drums compared to the current monitoring practice.