Patent Search

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Inventor

Name	Address	Country	Nat
Dr. K N S Durga Prakash	Assistant Professor, Dept. of EEE Vishnu Institute of Technology, Bhimavaram	India	Ind
Dr. Reddi Khasim Shaik	Associate Professor, Dept. of EEE Vishnu Institute of Technology, Bhimavaram	India	Ind
Dr. V S N Narasimha Raju	Professor, Dept. of EEE Vishnu Institute of Technology, Bhimavaram	India	Ind
Mr. Mukkavalli Sai Srinivas	UG Student, Dept. of EEE Vishnu Institute of Technology, Bhimavaram	India	Ind
Dr. R V D Ramarao	Professor & Head, Dept. of EEE Vishnu Institute of Technology, Bhimavaram	India	Ind

Applicant

Name	Address	Country	Na
Vishnu Institute of Technology, Bhimavaram	Vishnupur, Kovvada, Bhimavaramm, Andhra Pradesh, India-534202	India	In

Abstract:

The manual cleaning of sewers and septic tanks have significant risks to workers due to the presence of hazardous gases, including hydrogen sulphide, methane, anc These environments remain dangerous despite of safety measures and personal protective equipment. The proposed technology introduces a real-time gas monitor mitigate these dangers and address the challenges. This innovative system integrates continuous gas level assessment devices with a responsive control mechanism. hazardous conditions are detected, it immediately initiates the safety protocols and alerts the personnel outside confined spaces. The prime objective of this inventio enhance the workers safety in confined sewer and septic tank environments and reducing accidents and fatalities. It provides continuous monitoring and immediate system aim to revolutionize safety standards in the sanitation industry. The proposed system utilizes advanced sensor technologies and wireless communication pro ensure reliable and real-time data transmission. The control mechanism of this system triggers automatic safety responses, includes emergency alarms and ventilatic Furthermore, the system provides valuable insights into gas concentration trends, enabling proactive maintenance and optimized cleaning schedules. This system off vigorous and reliable solution for real-time gas monitoring and helps prevent accidents, reduce injuries and save lives.

Complete Specification

Description:The invention introduces an economic IoT-based real-time gas monitoring system utilizing multi-sensor union. It detects the hazardous gases in confine septic tank, and scrapped waste environments. Unlike conventional portable detectors, the proposed design integrates multi sensors like MQ-series sensors (MQ-0 CH_4, MQ-136 for H_2S, MQ-07 for CO, MQ-135 for NH_3/CO_2), oxygen sensor, and ultrasonic proximity detection with an ESP32 microcontroller. It utilizes the LoRa mod long-range, low-power wireless transmission to ThingSpeak IoT platform.

The system employs threshold-based logic to trigger automated responses, including ventilation activation via stepper motor. It also gives emergency alarms, and r alerts to supervisors before worker entry. This configuration ensures high-sensitivity detection, predictive gas trend analysis, and blockage prevention with minimal components.

Additionally, the modular topology supports economic and scalable deployment across urban/rural sanitation infrastructures. It enhances the reliability through sel calibration and power-efficient operation under harsh conditions.

, Claims:1. An IoT-based real-time gas monitoring system for confined sewer and septic tank safety comprising a multi-gas sensor array (MQ-02 CH_4, MQ-136 H_2S, CO, MQ-135 NH_3/CO_2, oxygen and ultrasonic sensors), ESP32 microcontroller, LoRa module, ThingSpeak platform, and automated actuators. The proposed technolo provides continuous detection with threshold-triggered remote alerts and safety responses.

2. The system as claimed in claim 1, wherein the ESP32-LoRa integration enables long-range, low-power wireless transmission of gas trends and blockage data to ThingSpeak for remote supervisor monitoring.

3. The system as claimed in claim 1, wherein gas concentrations exceeding predefined limits automatically activate ventilation via stepper motor, alarms, and acce

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