Intelligent Sensor-Based Alarm System for Enhanced Safety in the Oil and Gas Industry

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Abstract - Many unexpected accidents occur in a variety of industries these days. Safety is therefore crucial in the industrial sector. In the current research paper, a new intelligent smart protection system for industry based on multiple sensors, an Arduino UNO microcontroller, and an IoT network is proposed. This invention, an Arduino UNO-based Internet of Things petroleum industry protection system, can sense temperature and identify any gas, fire, or smoke leaks. Using a Wi-Fi module, monitor the temperature and gas concentration on an IoT platform. prevent accidents in the industries and save a lot of lives. This protection system emits a buzzer sound to alert users when gas or smoke levels get too high. In this case, the device for sending and receiving data is communicated with via the Internet of Things. In this case, the Internet of Things is utilised to communicate with the device in order to send and receive the necessary data and information via the internet. Thus, it can be accessed and managed via a computer, smartphone, or other smart device at any time and from any location. The work's major output is the combination of computer programming and embedded electronics.

Key word: Industrial Safety, Fire, Smoke, Gas detectors, IoT

I. INTRODUCTION

In daily life, industrial monitoring is more significant. Due to the possibility of gas leaks, chemical component increases, temperature increases, and other factors, numerous accidents may occur in the industrial sector. An IoT-based defence is needed to overcome these. We can keep an eye on the most recent environmental conditions on our laptops or mobile devices with this IoT platform. An industrial protection system includes a variety of features, such as multi-media equipment for monitoring and activating safety apparatus (alarms and alerts) associated with windows and doors, highly advanced automatic systems for controlling temperature and gas leakage, and many more. This system's computer systems can monitor numerous facets of daily life, giving the impression that it is "intelligent." It is crammed full of different sensors to gather data about the state of the industry right now.

This paper presents a percussive study towards a systematic Literature review work that aims to identify the industry protection system's safety requirements for IoT-based devices. Systematic studies use a structured approach for search and study selection in order to provide an overview of a field of study. Defining the research strategy used to choose pertinent studies from which to derive the topic's qualitative findings is a crucial component of a systematic literature review. In the paper, we present a continuous gas monitoring of the output generated by the research up to this point.

The structure of the paper is as follows. In Section 2, the necessity for a systematic review is explained and relevant work is briefly mentioned. Section 3 delineates the employed research methodology. The implementation and findings from the research phase are presented in Section 4. The paper is concluded in Section 5. To the best of our understanding, the most recent work focused on reviewing IoT safety, where the focus lies on protection concern. By IoT platform we can easily check the gas and temperature concentration. Another recent study focuses on Industry 4.0 system architecture as a whole and observes that there is an increase in safety- focused architectural proposals. In this section, we present the research method that will be used in the systematic literature review on safety requirements by the IoT that will extend this work. We adopt the research method detailed by Petersen et al., and utilized the suggested template for describing our approach. In the next subsections, we elaborate on research questions, search strategy, study selection, and validity concerns.

II. EXISTING AND PROPOSED SYSTEM

Implementing an industry safety monitoring system that detects gas leaks, shows the concentration of gases, and is suggested to implement an Internet of Things-based industry monitoring system. One of the most pressing needs of humanity since the beginning of time is industry safety and protection. But in order to ensure wide coverage, remote operation, dependability, and real-time functioning, it needs to be updated with the rapidly advancing technology of

today. Along with the user-friendly interface of an industry-based safety system, the deployment of wireless technologies for safety and control in automation systems offers appealing benefits.

In contrast to the methods currently in use, we have developed a low-cost method that involves sensor calibration, the creation of an IoT platform, and sensor data monitoring. The WiFi module transmits data to the Internet of Things, where it is exhibited on the platform. The Dallas temperature sensor (DS18B20) is used to detect the environment's temperature. It will sound a piezoelectric buzzer when the values of MQ9 and MQ2 reach the limited set up value, and the gas concentration will be shown on the LCD display. The problem will then be fixed, and the gas leakage portion will be noted. The gas passing will stop. The fan will turn on and begin to rotate when the temperature rises above a certain range.

III. RESULT AND DISCUSSIONS

As the economical sensors are not much precise than the high cost sensor, we are implementing with Arduino UNO microcontroller and calibration of sensors and in addition to that we are adding free IoT platform. First of all, we are focusing the creation of the training model in reality the leakage of gas is detected and an alarm is given then a valve will be closed and a LCD will display the Warning message. The buzzer will make an alarm when gas reaches it's limits or an range. The valve used is in the pipe line of gas. as it is a prototype the valve is not attached in the gas flowing pipeline.

• Arduino • MQ-2 Gas Sensor • DS18B20 SENSOR • MQ-9 Gas Sensor • ESP8266 Wi-Fi module • 16x2 LCD Display • Piezoelectric Buzzer • Power Supply

In this hardware implementation, we use Arduino Uno controller and we interface various gas sensors (mq9, mq2) to detect leakage of gas in petroleum industry, and we use DS18B20 temperature sensor to monitor temperature in industry. The program is dumped in controller to measure the change in gas levels from industrial atmosphere.as it is prototype we tested by spraying some perfumes and igniting smoke near it. It is repeated for all other gas sensors.
A device that senses the existence of one or more different types of gases in the surrounding air is called a gas sensor. These sensors can be used in many different settings, including homes, industrial facilities, and refineries. Gases that are toxic, flammable, polluting, and other types can all be detected by these sensors. Although there are several techniques for detecting gases, electrochemical sensors are the most widely used. These sensors use a chemical reaction on their heated electrodes to measure the electric current that results, which allows them to measure the concentration of a particular gas. The module needs to be calibrated before we can use it.
This sensor uses the resistance ratio to determine the gas concentration. This ratio comprises Rs (sensor internal resistance that varies with gas concentration) and R0 (sensor resistance at 1000 ppm concentration of LPG). After preheating in clean air, upload the code below and give it about 15 minutes to see R0 stabilise. When the code gets uploaded the temperature readings will get displayed in degree Celsius in LCD and on the serial monitor. Observe that as the temperature near the sensor changes the readings on the webserver also changes. We have designed a simple payload format you can use to send/get data from your devices to/from Ubidots using this protocol. After interfacing the controller and Wi-Fi module and Ubidots, the sensor values can be displayed in the Ubidots dashboard. ESP8266 provides a complete and self-contained wireless fidelity networking solution, grant it to either host the application or to offload all wireless fidelity networking functions from another application processor. In this example, the ESP8266 serves as a wireless fidelity adapter, increase wireless internet access to any microcontroller-based module through the UART interface. In this case we use an Arduino UNO.

IV. CONCLUSION

We have come to the conclusion that the project indicates that there are variations in the voltage levels of the MQ2, MQ9 sensors for the corresponding levels of gas concentration, which are detected before reaching zero. UBIDOTS received this training data and generated well-trained values for the sample data set. when the corresponding results are displayed alongside the values on the LCD display. The low-cost sensor can function like a high-cost sensor and can provide fewer error outputs, according to this project.

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