WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Iot Based Petroleum Industry Protection System

Karpagam V[a]*, Keerthivasan S[b], Tharun Kumar B[c], Haripriya S[d]

[a]*Assistant Professor (SS), Dr.Mahalingam College of Engineering and Technology, Pollachi 642003, India*
[b,c,d] *UG Scholar, Dr.Mahalingam College of Engineering and Technology, Pollachi 642003, India*

A B S T R A C T

Today there are many sudden accidents are happened in various industries. So, Safety is important in industry sector. A new intelligent smart protection system for industry based on various sensors, Arduino UNO microcontroller with IoT network is proposed in current research paper. This innovation namely IoT Based Petroleum Industry Protection System Using Arduino UNO will detect any leakage of Gas, Fire, Smoke and sensing temperature Keep track of the condition of Gas concentration and temperature in IoT platform through a Wi-Fi module.protect the industries from accident and saves many lives. In this Protection system if the gas or smoke reaches a certain extent it gives a signal by buzzer sound. Here Internet of Things is used to communicate with the device for sending and receiving required information and data through internet. So it can be controlled and monitored from anywhere & anytime through computer, mobile or any smart device. More over combination of embedded electronics and Computer programming is the significant outcome of the work.

Keywords: Industrial Safety, Fire, Smoke, Gas detectors, IoT

1. Introduction

The industrial monitoring is more important in day-to-day life. Because many accidents may happen in the industries by any gas leakages, Chemical components increases or temperature increase and so on. To overcome from these an IoT based protection is required. With this IoT platform we can monitor the updated environmental conditions in Mobile or Laptops. Industrial protection system is one that has highly advanced automatic systems for controlling gas leakage and temperature, multi-media equipment for monitoring and activating safety apparatus (alarms and alerts) associated with windows and doors and many other functions. This system appears "intelligent" because its computer systems can monitor many aspects of daily life. It is packed with varieties of sensors to convocation information about the present condition in the industry.

1.1. Contribution to the Paper

I In this paper, we present a percussive study towards a systematic Literature review work that aims at identifying safety requirements of the IoT based industry Protection system. Systematic studies are meant to give an overview of a research area, Following a structured methodology with respect to searching and study selection. An essential part of a systematic literature review consists of defining the research method follow to select relevant studies that are later used to extract qualitative results on the topic. In the paper, we provide a monitoring as well as continuously changes in gases of the output produced by the research as yet.

1.2. Outline of the Paper

The paper is organized as follows. Section 2 briefly mentions related work and motivates the need for a systematic review. Section 3 describes the research method used. Section 4 presents the Implementation and results obtained during the research phase. Section 5 concludes the paper.

1.3. Related Work

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.

1.4. Research Method

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.

2. Existing System

Implementation of detecting the gas leakage based industry safety monitoring system and displaying the gas concentration and proposed Implementation of IoT based Industry Monitoring system. Industry safety and Protection is one among the important needs of mankind from youth. But today it's to be updated with the speedily changing technology to make sure vast coverage, remote, reliability, and real time operation. Deploying wireless technologies for safety and control in automation systems offers attractive benefits along side user friendly interface INDUSTRY BASED SAFETY SYSTEM.

3. Proposed System

Compared to the existing methods we have defined with low cost method, with calibration of sensor and creating an Iot Platform then monitoring the sensor data. The Wi-Fi module that sends the data to the IoT and it will be displayed in the platform. When the value of MQ9 and MQ2 have reached the limited set up value it will make a sound with the help of piezoelectric buzzer and the gas concentration is displayed in the LCD display, then it will be rectified and the gas leakage portion will be noted the gas passing will stop the Dallas temperature sensor(DS18B20) is used for detecting the Temperature of the environment. When the Temperature is increased certain range the Fan will begin to ON and will OFF when the Temperature is decreased in the certain range.

4. Implementation and result

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.

4.1Hardware Requirements

- 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.

4.2 Configuration of Arduino UNO with MQ-2, MQ-9

A gas sensor is a device that detects the presence of one or more types of gas in the environment. These sensors have wide applications such as safety systems of refineries, industrial centers, and even homes. These sensors can detect combustible gas, toxic gas, pollutant gas, and so on. There are several methods for gas detection, the most commonly used is electrochemical sensors. These sensors measure the concentration of a specific gas by performing a chemical reaction on their heated electrodes and measuring the resulting electric current. Before using the module we have to calibrate it. This sensor

measures the gas concentration based on resistance ratio. This ratio includes R0 (sensor resistance in 1000ppm concentration of LPG) and Rs (Internal resistance of the sensor which changes by gas concentration). In clean air, after preheating, upload the following code and wait for about 15 minutes until R0 reaches a fixed value.

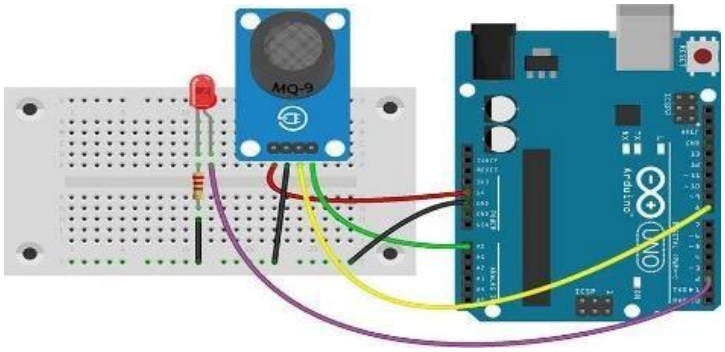

Fig 4.2.1 MQ9 Gas sensor

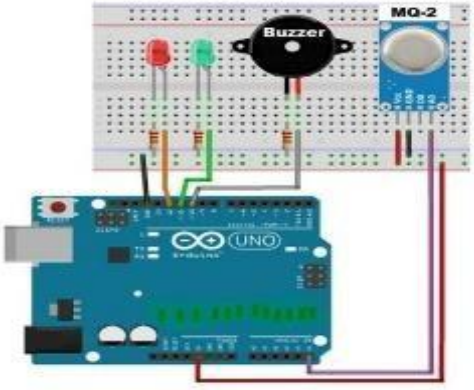

Fig 4.2.2 MQ2 Gas sensor

4.3 Configuration of DS18B20 with Arduino UNO

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.

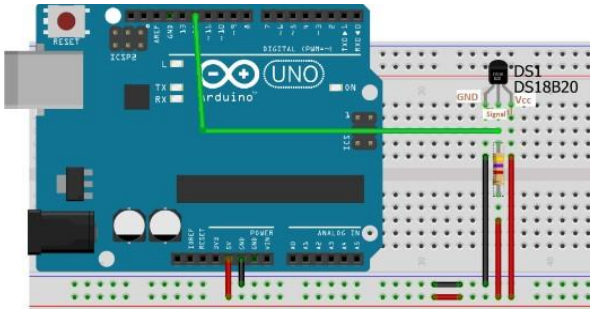

Fig 4.2.1 DS18B20N

4.4 Configuring ESP-8266 with Arduino UNO and UBIDOTS

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.

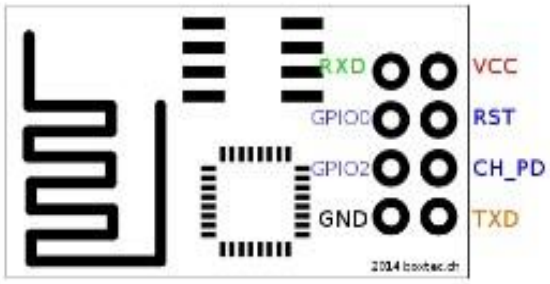

Fig 4.3.1 ESP8266

4.5 Software Requirements

- ***Arduino IDE***
- ***UBIDOTS***

4.6 Software Implementation

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.

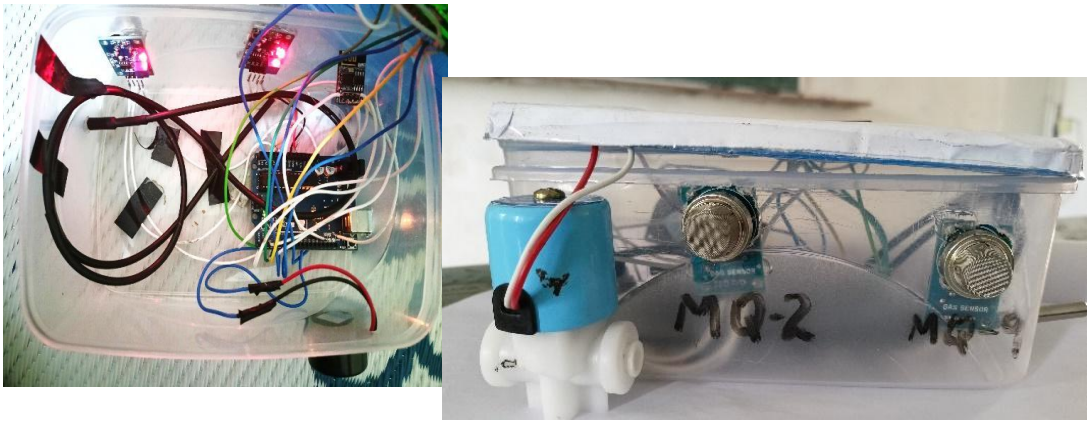

Fig 4.6.1 Hardware model

4.7.Analysis:

Table 1 – Gas Concentration Measurement of MQ2

Sensor	Alcohol	Methane	Butane	LPG and propane
Mq2	100ppm-2000ppm	5000ppm-20000ppm	300ppm-5000ppm	200ppm-5000ppm

Table 2 – Gas Concentration Measurement of MQ9

Sensor	Methane	LPG	CarbonMonoxide
MQ9	500ppm-10000ppm	500ppm-10000ppm	20ppm-2000ppm

4.8. Result

Fig 4.8.1 LCD Display

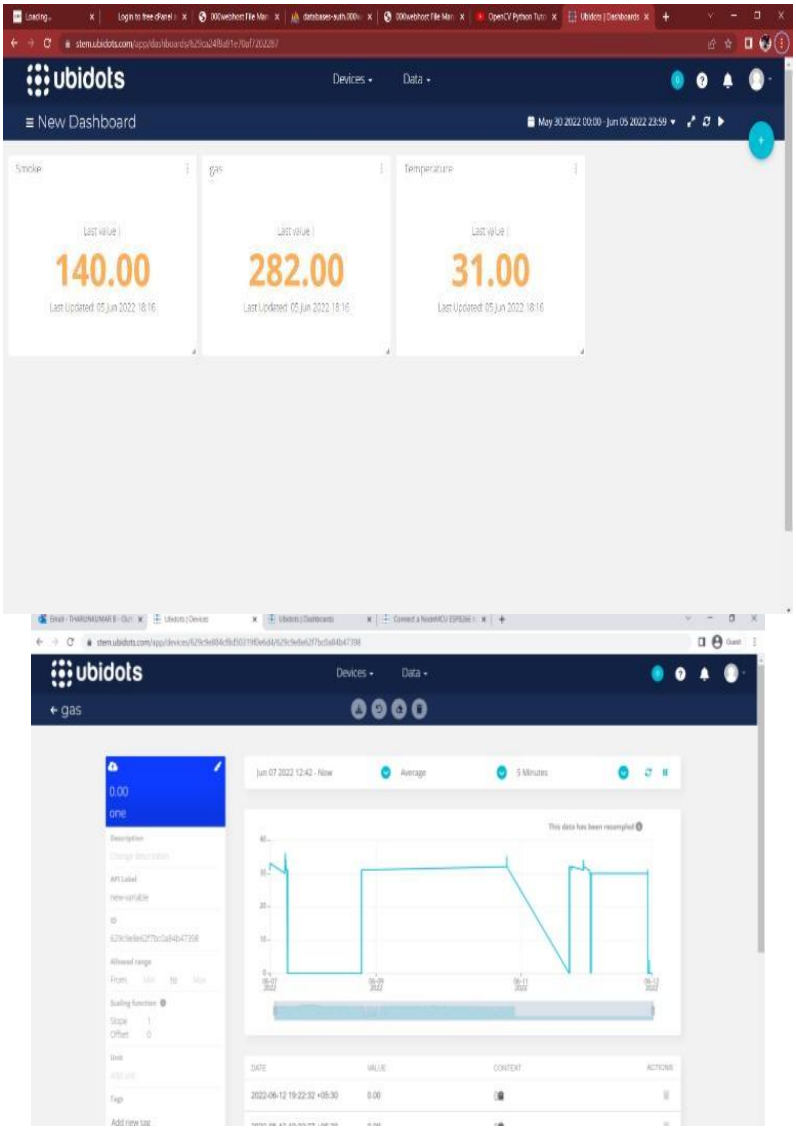

Fig 4.8.2 UBIDOTS Results

5. Conclusion

We have concluded that project gives that there is difference in the voltage levels of the MQ2, MQ9 sensors for the corresponding gas concentration levels it is identified from making it to the zero level. This training data is fed to UBIDOTS which produced the good trained values for the sample data set. When the values are displayed in LCD display and it shows the corresponding results. This project also states that the low-priced sensor is capable of acting like high cost sensor and can produces less error outputs.

6. Future Scope

In the future extension, the light monitoring is interfaced to the project and also a Surveillance Camera is made monitoring the system for live monitoring in the various situation and environmental conditions. Thereby, considering preceding environmental conditions, Observation frequencies and other environmental information such as hydro interference, Smoky and impurities air to improve this project may happen. It also Key to prepare datasets obtained from a radius of environments for the practical applications in future work. In addition, it is useful to analyze automotive emissions with integrated mobile sensors in the vehicles and utilize the model's improvement from this project

REFERENCES

[1] Huixiang Liu., Qing Li, Dongbing Yu, and Yu Gu., "Air Quality Index and Air Pollutant Concentration Prediction Based on Machine Learning Algorithms," Applied Sciences, vol. 9, no. 19, p. 4069, Sep. 2019.

[2] Laurent Spinelle, Michel Gerboles, Maria Gabriella Villani, Manuel Aleixandre, and Fausto Bonavitacola, "Field Calibration of a Cluster of Low-cost commercially available Sensor for Air Quality Monitoring". Part b: No, co and co2. Sensors and Actuators B: Chemical, 238:706–715, 2017.

[3] Winsen, "Air Quality Gas Sensor", MQ - 135 datasheet, Oct. 2014 [Revised Sept. 2018].

[4] How2electronics, "IoT Based Air Quality Index Monitoring with ESP-32 & MQ135".

[5] L. Sun, D. Westerdahl, Z. Ning, "Development and Evaluation of a Novel and Costeffective approach for Low-cost NO2 Sensor Drift Correction", Sensors 17 (8) (2017)

[6] Goh, C.; Kamarudin, L.; Shukri, S.; Abdullah, N.; Zakaria, A. "Monitoring of Carbon Dioxide (CO2) Accumulation in Vehicle Cabin", In Proceedings of the2016 3rd International Conference on Electronic Design (ICED), Phuket, Thailand, 11–12 August 2016; pp. 27–432.

[7]Ziyue Guan., Richard O. Sinnot., "Prediction of Air Pollution through Machine Learning Approaches on the Cloud", 2018. IEEE/ACM 5th International Conference on Big Data Computing Applications and Technologies (BDCAT)

[8] Ahmad El Kouche"Towards a Wireless Sensor Network Platform for the Internet of Things", IEEE ICC 2012 - Adhoc and Sensor Networking Symposium.

[9]Mihai T. Lazarescu, "Design of a WSN Platform for Long Term Environmental Monitoring for IoT Applications" IEEE Journal on emerging and selected topics in circuits and systems, vol. 3, no. 1, March 2013.

[10] S. Sivajothi Kavitha, S. Senthilkumar, "A Wireless GasLeakage & Level Detection with Auto Renewal System". International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 4, Issue 4, April 2015, pp.: 2095-2100.

[11] R. Naresh Naik, P. Siva Nagendra Reddy, S. Nanda Kishore, K. Tharun

[12]Kumar Reddy, "Arduino Based LPG gas Monitoring& Automatic Cylinder booking with Alert System". IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), Volume 11, Issue 4, Ver. I (Jul.-Aug .2016), PP 06-12.

[13] Zaw Lin Oo, Theint Win Lai, Aung Moe, "Iot Based Lowcost Physical Protection and Alarm System for GammaIrradiation Facility". Conference on Science and Technology Development (CSTD-2019), Oct 31- Nov 1, 2019.

[14] "MQ-2 Semiconductor Sensor for Combustible Gas,[online]. Available: https://www.pololu.com/file/0J309/MQ2.pdf