A Survey On:-IOT Based Industrial Plant Safety Gas Leakage

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ABSTRACT

- Most of the fire-breakouts in industries are due to gas leaks. These cause dreadful damage to the equipment, human life leading to injuries, deaths, and environment. Currently available leakage detectors warn the people around using on-site alarms. So, this project proposes a leakage detector which sends the warning to the concerned people through SMS . This detector senses the presence of harmful gases particularly, LPG, Methane and Benzene. LPG and Methane gases catch fire easily resulting in blasts. Benzene is carcinogen effecting the health of workers, if inhaled in higher concentrations. Hence, detection of these gases is essential. This low cost project includes MQ6, MQ4 and MQ135 gas sensors which detect LPG, Methane and Benzene gas leaks respectively and uses a Wi-Fi module. The concentration levels of the above mentioned gases are uploaded in the UBIDOTS cloud and the login details are included in the alert message so that the user can check, if needed. The prototype of the proposed system generates a sound alert using buzzer on detection of a dangerous leakage and sends an SMS to the concerned person using IFTTT web service. Different color LEDS are used to specify the gas leaked for example, RED LED indicates the presence of LPG.

Keyword :- *MQ6 Sensor, MQ-135 Sensor, Arduino Uno.*

1. INTRODUCTION

The number of gas leaks that happen every year on industrial plants is obscure. The majority of these leakages, regardless of whether recognized, go unreported when they do not straightforwardly prompt tangible mishaps. Environmental Protection Agency (EPA) reports evaluate that in the United States alone, these plants discharge close to one billion cubic meters of methane (not taking some other gas into account). The majority of these misfortunes (around 80%) appear to originate from flawed compressors, valves, seals, and connectors. In 2012, around 2200 million metric tons of CO2 were inadvertently discharged from oil frameworks and other synthetic procedures vital for the creation of iron, bond, plastics and steel. It is assessed that around 800000 holes are examined every year on refineries, with in the vicinity of

200 KM having specifically brought about death toll, wounds, harmed hardware, or operational misfortunes. To put it plainly, industrial gas leakages introduce a note worthy challenge in the mission for protected, ecological cordial, and financially savvy plants. LPG and Natural gas comprise of mixture of gases like propane, butane and methane. These gases can catch fire and burst into flames effectively . In the process of their production and transportation when a leak occurs, the leaked gases may prompt blast. The number of deaths due to the blast of gas barrels has been increases. So the spillage ought to be controlled to shield individuals from peril. Bhopal gas disaster is a case for mishaps because of gas leakage. Gas leakage recognition is not just vital yet controlling the spillage is also equally important. LPG is the most commonly

utilized gas in houses and enterprises. LPG breaks can happen, however once in a while, inside a home, business premises or in gas controlled vehicles. Spillage of this gas can be hazardous as it upgrades the danger of blast. An odorant, for example, ethane thiol is added to LPG, with the goal that its presence can be recognized effectively. In any case, a few people who have a less sense of smell will most likely be unable to depend upon this inalienable instrument. In such cases, a gas leakage detector ends up indispensable and shields individuals from the perils of gas leakage. Benzene is a known cancer- causing agent that is present in tracking back flow water in industries. It is also found in fuel, tobacco smoke and in concoction producing. As a known carcinogen, benzene exposures in the work environment are restricted by government controls under OSHA. In any case, some oil and gas production exercises are excluded from those gauges. The National Institute of Occupational Health and Safety worked with industry to gauge synthetic exposures of specialists who screen back flow liquid at well locales in Colorado and Wyoming. In several cases benzene exposures were observed to be above safe levels. Unconventional oil and flammable gas laborers could be exposed to perilous levels of benzene, putting their lives at a higher hazard for blood malignancies like leukemia. Hence, Benzene detection system is must.

2 Literature Survey

- **Sensor-Based Gas Leakage Detector System,Mohammad Monirujjaman Khan 14 November2020**

This system is to propose and discuss a design of a gas leakage detection system that can automatically detect, alert and control gasleakage. In this paper,the user is alerted about the gas leakage through SMS and the power supply is turned off [6].Meenakshi Vidya et al. proposed the leakage detection and real time gas monitoring system. In thissystem, the gas leakage is detected and controlled by means of an exhaust fan. The level of LPG incylinder is also continuously monitored [7]. Selvapriya et al. proposed the system in which the leakage is detected by the gas sensor and produce the results in the audio and visual forms. It provides a design approach onsoftware aswell as hardware [8]. In the existing method, different gas sensing technology is used.

- **IOT Based Industrial Plant Safety Gas Leakage Detection System , Ravi Kishore Kodali, Greeshma, R.N.V. 2018**

This system generates a sound alert using buzzer on detection of a dangerous leakage and sends an SMS to the concerned person using IFTTT webservice. Different color LEDS are used to specify the gas leaked for example, RED LED indicates the presence of LPG.

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IoT Application for Gas Leakages Monitoring , BaThanh Nguyen1, Anh Vu Nguyen2 2020

This project contributes to the application of IoT to life to help families feel more secure in the matter of using gas. In this paper,Gas leaks are a potential risk in homes and other areas that use gas, so monitoring equipment is needed to limit the risk of harm. This paper presents the design and construction of IoT-based gas leak detector and alarm. This is an intelligent device with a highly sensitive gas sensor and LCD display that displays the device's status as well as the gas value in the environment. Thedevice is placed in a position where there is a possibility of gas leaks. If the device detects that gas exists in the environment beyond the limit, it will immediately turn on the light, warning the buzzer. At the same time, the device will automatically call the phone number to notify in time, in case the owner is not in the area where the gas leak occurs. Also, the deviceis connected to the Internet so the gas value in the environment will be posted to the internet for online monitoring. This project contributes to the application of IoT to life to help families feel more secure in the matter of using gas.

3. Block Diagram :

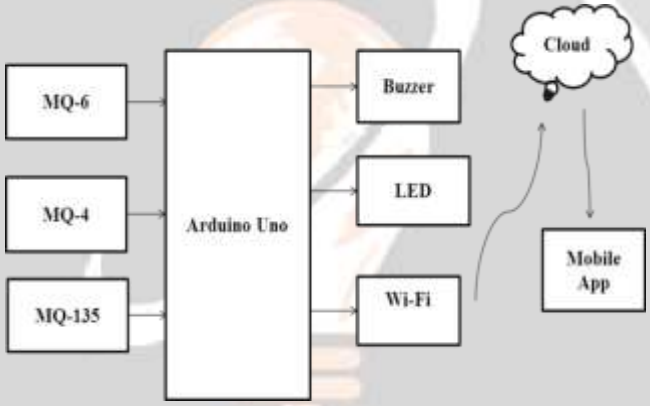
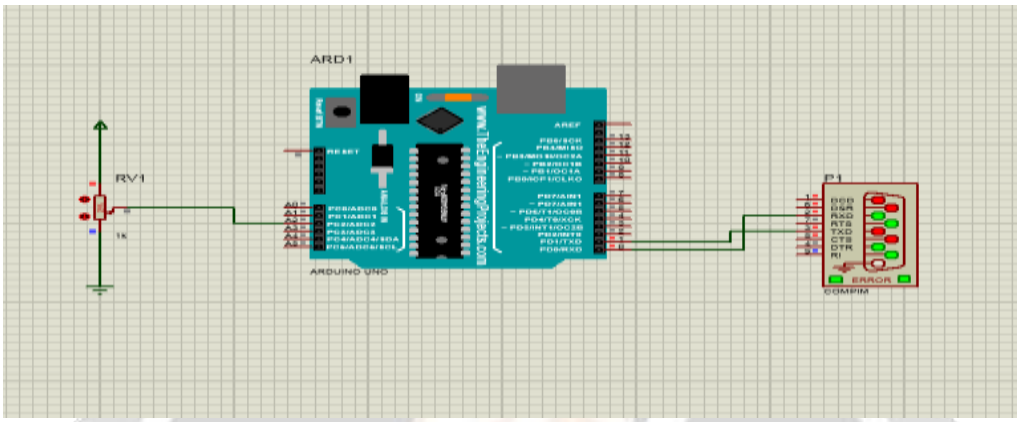


Fig. Block Diagram

Project consists of three sensors, a controller, Buzzer, and an LED system. The gas leakage is detected by the sensors. Here, MQ-6 sensor is used for sensing LPG concentrations in air. Similarly MQ-4 sensor for Methane and MQ-135 sensor for Benzene. They can detect gas concentrations in the range of 200 to 10000 ppm and has very fast response time . The sensors output is an analog resistance. The change in analog resistance is convertedto voltage through a signal conditioning circuit. This voltage is read by the controller. An in-built 12-bit ADC converts this analog voltage into digital form. The controller measures this data and compares with threshold.If the measured concentration levels cross the safe levels, an SMS is sent to the concerned person through

IFTTT . Simultaneously, Buzzer gets on to alert the workers about the leakage and LEDs will be made to glow tospecify the gas which is currently leaking.

4. RESULT:



5. CONCLUSIONS

In our system architecture, multiple sensors are placed around the region of interest in the plant. An BLYNK APP based gas leakage detection system with an alerting message feature to the response team is presented. The Sensing System detects the leakage and Alerting system sends a warning message through WIFI onBLYNK APP. A prototype of the gas leakage detection system has been developed and successfully tested with Methane, LPG and Benzene. The warning message is successfully sent to the mobile number with very less delay. The proposed leakage detection with warning message to the single user can bereached out to send calls/SMS to multiple people and can also be linked directly to the fire station as well. Future work includes cleaning of the sensor data by averaging the collected data. Also, multiple sensing devices can be interfaced for various applications and can carry out signal processing. Though this work was done with industrial plants in mind, we feelthat similar kind of approaches can be proposed in cities of the future, where a gas detection and confinement system can help in addressing the problems of leaks in gas pipelines, while preserving extensibility and usability, our framework has design simplicity.

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