

Detection of Gas Leakage in Polymer Industries using IOT

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Abstract: Gas leakage is one of the major issues in polymer industries. The leakage of gas leads to major fire accidents which lead to heavy damage inside the industry as well as the loss of human beings. It is feasible to detect the gas leakage before any disaster happened. So industries need a very efficient gas leakage detection system. The aim of this paper is to propose an industrial safety system for workers working in these types of polymer industries by automatically detect, alert and control gas leakage, fire and smoke using IOT based system.

I. INTRODUCTION

Gases leaked from polymer and carbide industries are very harmful to all living things. Major disaster happened at Bhopal on December 3, 1984. Recently an industrial accident occurred at LG polymers chemical plant in the Vishakapattinam. As per the National Disaster Response Force (NDRF), the death toll was 11, and more than 1,000 people became sick after being exposed to the gas. To prevent from these types of accidents, safety system should build in high quality standards. Safety should be ensured by all levels. To incorporate technology in the Safety System, Internet of Things (IOT) technology is used to detect the gas leakage and prevent the disaster before it happened. Internet of Things [IOT] is a system of interrelated computing devices without human – human or human– computer interaction. IOT is used to automating the daily tasks, the benefits of IOT can also be extended for enhancing the existing safety standards.

Safety is the most important criterion while designing polymer industries. The spread of highly concentrated gases in the atmosphere can produce extremely dangerous condition. These gases might be flammable at certain temperature and humidity conditions, toxic after exceeding the specified concentrations limits or even a contributing factor in the air pollution of an area leading to problems such as smoke and reduced visibility which can in turn cause several accidents and also have adverse effect on the health of people.

II. EXISTING SYSTEM

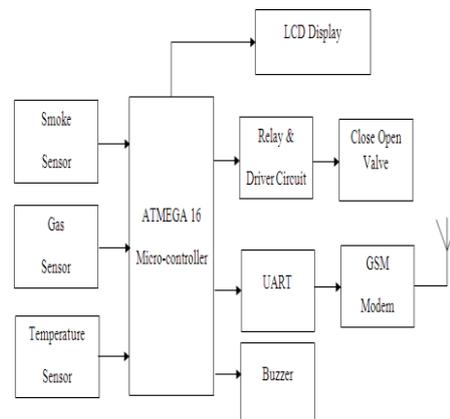
In the existing method, **gas sensing technology** is used. The LPG leakage is detected by the semiconductor sensor. The leakage of gas may happen due to the human error, false chemical reaction, lack of service done in the gas valve. In the existing

method, periodic check done by manually and partial sensing methodology is used. When the leakage was happened, it leads to major fire accident Before controlling the fire major accident may happen which leads to heavy loss in industry as well as human life. In addition to that the leak of gas may spread in the atmosphere, it may affect all the living things in an around them.

In the existing system MQ5 sensor is used to detect gas leakage. Exhaust fans are used to suck out the gases when the leakage occurs. In the existing method, it raises only alarm whenever Gas leaked or fire is detected at any place in a factory. Due to this alarm, people could start to run haphazardly. Fire Service truck vehicle only control the fire accident.

III. PROPOSED SYSTEM

In order to overcome problems exists in the existing system, the proposed system consist of sensors which is capable of detecting and classifying the gases, fire, smoke and used to prevent from explosive gases. If the system detects a gas leakage, then the systems shuts down the production unit and also switch off the main power supply by automatically. The system now starts an exhaust fan to out of all the leaked gas. Also the system sends information of this event to the authorized user through an SMS message using GSM



modem. The system has a fire sensor to detect fire if it happened beyond the consequences. While a fire is detected, the system should activate the existing fire extinguisher to control the fire.

This system also avoids the concept of wastage of

resource at various industrial and domestic places. MQ6 gas sensor is used to sense the amount of leak gas present in the surrounding atmosphere. If the gas is leaked then it will trigger the buzzer. Also it sends notification of this hazard to the authorized user, so user can take necessary action urgently.

The proposed system uses MQ-6 sensor which detect the gases like butane, carbon-di-oxide, carbon monoxide. And this system takes an automatic control action after the detection of 0.001% gas leakage using MQ6 sensor. It provides automatic control and activates the mechanical handle to close the valve. If the gas leakage is detected automatically alert message has been sent to the authorized person and the fire station by using GSM .The message contains which type of gas is leaked. The alarm will be raised in the industry.

IV. ARCHITECTURE DIAGRAM

In the proposed architecture, three types of sensor are used such as smoke sensor, gas sensor and temperature sensor. All sensors are connected to Microcontroller which is connected to LCD display and Relay Driver Circuit and UART and buzzer. The microcontroller senses the sensors output periodically and generate the report. If any anomaly happens, the microcontroller generates appropriate action.

The microcontroller displays the output in the LCD display. If the microcontroller detects any gas leak then it activates the relay circuit and closes the valve of gas production unit. It also sends the alert message to the administrator using GSM Modem. It raises an alarm and alert the workers those who are worked in that environment.

V. CONCLUSION

Safety is the most important measure, and the cheapest option to preventing accidents and mishaps. Thus the proposed system is that the gas leakage is automatically detected and effectively dealing with the problem within 2 milliseconds, after the leakage starts. This system can able to sense 0.001% of leakage. This is an efficient method for automatically detecting and controlling the different type of gas leakage.

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