IDEATION

LITERATURE SURVEY

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| DATE | 19 OCT 2022 |
| TEAM ID | PNT2022TMID41407 |
| PROJECT NAME | HAZARDOUS AREA MONITORING FOR INDUSTRIAL PLANT POWERED BY IOT |

Abstract

Gas leakage and fire explosion are the major problems in the industrial like a chemical warehouse, LPG gas cylinder storage, and combustible material storehouse also in the residential zone. Sometimes abnormal temperature and humidity variation may cause accident in these storehouses of combustible chemicals, liquids and gases. So, the most efficient and preventive procedure is to set up such a device that can detect all these situations which causes fire explosion. This paper proposes a study with a prototype that can detect most of the combustible gas and LPG gas leakage with the help of MQ2 smoke sensor. Also, this project includes a temperature and humidity detecting sensor name DHT11 which is used to observe the unusual change in the level of temperature and humidity. Besides, there is also a barometric pressure sensor to detect the atmospheric pressure of the warehouses. When any fire or hazard occurs, the pressure of this enclosed area will be changed significantly that can be detected by barometric pressure sensor. All those sensors data are sent to the Adafruit IoT platform website dashboard monitored by the respective authority with the help of NodeMCU, WIFI development board. The whole system is run by rechargeable battery. Thus, the project goal is achieved

Design Methodology

The use of combustible chemicals and materials are increasing day by day. The demand of fuel is also increasing throughout the whole world. Liquefied Petroleum is now widely used almost everywhere for household purpose and industrial production. This liquefied gas is kept in a metallic cylinder under high pressure. Sometimes due to leakage, these cylinders explode and a severe accident occurs. Mainly accident occurs there due to an imbalance of inside environment factors like temperature, humidity, uncontrolled flammable gas leakage and atmospheric pressure sometimes. So, the LPG gas and fire detection with the alarming system is very necessary to implement those places discussed above. Recently in Bangladesh, many severe fire accident occurred like Nimtoli tragedy in 2010 and Wahid Mansion fire accident in 2019.

There the fire was started and spread vigorously due to leakage of LPG leakage and presence of flammable products which is very common scenario and causes in most of the fire A large number of studies have been done on the fire alarming safety system. Pritom Ghosh and Palash Kanti Dhar developed a gas leakage, explosion and fire alert system which is totally based on GSM technology. That means if the system can detect any abnormal change in the above factors told will send a message to the respective authority or person via GSM module accidents. So, the objective of our project is to monitor the fire risk factors from the server in some particular places by using this device based on IoT.

Implementation

Gas and smoke detection: For detecting smoke or gas, MQ2 sensor is used connected to NodeMCU development board. MQ2 operates at 3V to 5V supply voltage. Mainly this sensor has two pins for output. One is digital out pin follows the TTL logic and gives a result 0V or 5V. And another is analog out pin which gives output from 0V to 5V. This sensor can sense LPG, propane, alcohol, hydrogen (H2), carbon monoxide (CO), methane and also combustible steam [8]. In this system, analog out pin of MQ2 sensor is used to detect these combustible gas and steam inside the chemical and combustible materials warehouse. If the concentration of these gases increases above a certain level, then the conductivity of the sensor increases which gives the corresponding analog voltage as an output of the sensor and at the same time output data to the NodeMCU.

Temperature and Humidity detection: DHT11 is used in this project to detect the variation in temperature and humidity level. It needs 3V to 5V to power up itself. And the accuracy level of sensing temperature is ±2°C. For detecting humidity, the error level if +5%. And the range of temperature and humidity this sensor can detect are 20°C to 50°C and 20% to 80% respectively .

Atmospheric pressure detection: To detect the surrounding air pressure, BMP180 barometric pressure sensor is used. This sensor mainly measures absolute atmospheric pressure, atmospheric pressure with reference to different height level and also measure temperature. For this sensor, 3.3V or 5V supply voltage is needed. The pressure range of this sensor is 300hPa-1100hPa where the accuracy rate is ±0.12hPa.

Conclusion

This paper represents a study of implementation of a low cost IoT based fire alarming system which can be used in some particular places where the chemicals, combustible materials like battery and inflammable liquids and gases like LPG, fuel or perfume are stored. Since this system is connected to a definite server developed by Adafruit, so it is very easy to monitor the fire factors of that place by log into that website where the system is set. So, with proper monitoring, precautionary measures can be taken before any accident. And also, if anything unusual occurs like temperature or humidity increases to a certain level due to fire accident, then the buzzer will ring. In this way, many unwanted accidents can be avoided and people can be saved. Therefore, this device has multiple functionality in detecting combustible and LPG gas leakage as well as fire occurrence with low implementation cost which is the main state of the art of our works and create a difference with respect to the other works mentioned in the introduction section literature review paragraph.