International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 08 | Aug 2021 www.irjet.net p-ISSN: 2395-0072

# IOT BASED INDUSTRIAL MONITORING SYSTEM USING ARDUINO

**Kishore Kumar R[1], Nishanth N[2], Suriya Prakash S K[3], Dhanush Anand S B[4]**

[1]*U.G Scholar, Department of Electronics and Instrumentation Engineering, Kumaraguru College of Technology, Coimbatore -641049, Tamil Nadu, India.*
[2]*U.G Scholar, Department of Mechatronics Engineering, Kumaraguru College of Technology, Coimbatore -641049, Tamil Nadu, India.*
[3]*U.G Scholar, Department of Electrical and Communication Engineering, Kumaraguru College of Technology, Coimbatore -641049, Tamil Nadu, India.*
[4]*U.G Scholar, Department of Mechatronics Engineering, Kumaraguru College of Technology, Coimbatore -641049, Tamil Nadu, India.*

---

***Abstract*** *- Nowadays, gas leakage is a major issue in the home and as well as industries. The sense of the gas is very low means we can't find it because of human negligence or lack of patience or some other external condition. If the gas level is increased, it causes some disaster. 1, to avoid this disaster in advance, the alternative idea is discussed in this paper. The system is developed with embedded sensors, controllers, and some IoT-based software. In this system, we are monitoring the detection of LPG gas leakages with some alerting features. Some sensors are used to monitor the different parameters like Temperature and humidity sensors (DHT22), gas sensors (MQ-6), flame sensors (LM 2903), PIR sensors (HC–SR 501), and Wi-Fi module (ESPZ8266). The sensors all are collect their information in their respective field and send data to the Wi-Fi module and it will perform*.

***Key Words***: Wi-Fi module, sensors

## 1. INTRODUCTION

IoT has the potential to change the world, it can create information about the connected objects, analyze it, and make decisions; in other words, one can tell that the Internet of Things is smarter than the Internet. It is also used widely in the industrial sector. In the industrial sector, safety and security are given more importance, so to prevent accidental explosions due to leakage of various gases we are developing an industrial monitoring system using IoT. It will act as a security system also. The way this system works is that there will be an alarm when there's a gas leak with also displaying the gas level concentration and at which it will be in danger. Meanwhile, it will deduct all the people who all are entering the room.

### 1.1 PROBLEM DEFINITION

One of the main reasons for industrial accidents is the leakage of unwanted gases and the depth of workers in industries. Leakage of any sort of gases will cause an immense problem in present times whether household, industry, restaurants, etc. a need for a monitor and fault detection is now more required than ever. The proposed system uses an MQ-6 sensor that detects the leakage of LPG, CH4, and CO gases.

The main object of this project is to make a unique device for safely detecting the malfunction of an endangered factory to stop the release of combustible gases to prevent any explosion from taking place while also monitoring a lot of other factors for extra security.

### 1.2 SCOPE OF THE PROJECT

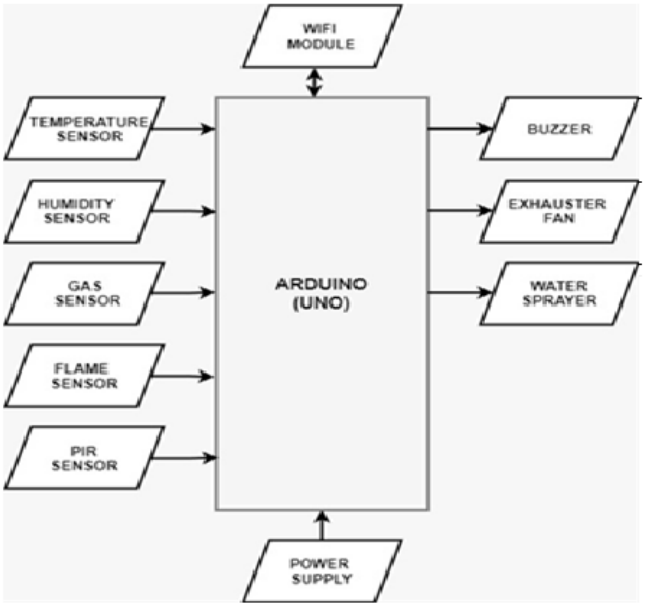
In this industrial monitor and fault detection system, we look closely into the gas leakage detection of some variety gases such as LPG, CO, and CH4, which causes various health problems and also has a possibility of an explosion. While taking a look at this we also detect if there are any flames in the nearby area. There is also motion detection up to a point where any type of movement will detect and alert during emergencies. Throughout the whole range of the system, temperature and humidity readings are taken at infrequent intervals to also keep them in check. Thus, we cover a certain range in the factory, monitoring various factors that may lead to a threat or an emergency in automated factories that use processes that are expensive and difficult to modify often.

## 2. LITERATURE SURVEY

Safety is the utmost priority of all industrial sectors as even minimal malfunctions in the mechanisms can lead to unavoidable deteriorating circumstances. Human monitoring system although with good efficiency has its drawbacks as turbulences in the accuracy rate in checking and monitoring mechanisms are inevitable. Total prevention of accidents in industrial workspaces is impossible but preventive measures to near perfection in our motive are achievable. A specified system with diverse technical devices such as sensor-based network integrated monitoring devices lowers the random and human errors produced in the validation process. Common factors such as gas leakage, fire explosion, and unauthorized entry that lead to inconveniences can be detected with optimum precision levels to avoid these disastrous scenarios. The modern

automation system provides the mechanism with desired parametric sensors to analyse the performable and structural states with historic component data and execute the required output based on the analysis made by the sensors. Instrumentational transducers are incorporated to accompany supervision in fault detection in mechanical parameters and accumulative data is transferred to the control system to structure an algorithm and dissipate the required output actions, thus enabling a whole-time industrial surveillance system to prevent accidents and maintain an efficient industrial environment

## 3. DESIGN METHODOLOGY




The project's design process is based on data, which is collected through several sorts of sensors like PIR sensors, flame sensors, gas sensors, and temperature and humidity sensors. These sensors are installed in the required locations, such as where the gas has leaked. The temperature and humidity sensors are used to display the readings, the flame sensor is used to detect fire, and the PIR sensor is used to notify unauthorized entry. These sensors gather data continuously and communicate it to the microcontroller (Arduino UNO). Arduino UNO is programmed with a specific threshold value. If the value is less than the threshold, the situation is normal. If it exceeds the threshold value, the Arduino UNO sends a signal to the corresponding output. If the gas is leaking, a buzzer sound is produced when the sense is very low. When the perception of smell is strong, the exhauster fan is activated. If a fire is detected by the flame sensor, the Arduino UNO is triggered, and the water sprayer is used to extinguish it if the fire is bright. Anyone who enters the industry without being allowed is tracked using a PIR sensor. On the LCD panel, all data is shown 24*7. Over IoT, data is sent and shared utilizing a Wi-Fi module. From our Wi-Fi network, we can control the Wi-Fi module. The Wi-Fi module allows microcontrollers to connect to wireless networks. The Thing speak website is used to provide graphical representations of all types of data from sensors including gas, flame, PIR, humidity, and temperature sensors. We have developed a fully autonomous IoT wireless sensor-actuator network for the monitoring of the environment.

| *INPUT* | *OUTPUT* |
|---|---|
| TEMPERATURE AND HUMIDITY SENSOR | BUZZER |
| GAS SENSOR | EXHAUSTER FAN |
| FLAME SENSOR | WATER SPRAYER |
| PIR SENSOR | LCD DISPLAY |

## 4. SENSORS

Sensors are used to improve the monitoring system by analyzing the various industrial parameters and then sending the necessary information to the Wi-Fi module which in turn sends the data to the portal. This information will be vital to know the current situation of the system and the various threshold requirements of the industrial environment. The handpicked sensor used by us in this project are listed below.

| **SENSORS** | **SPECIFICATIONS** |
|---|---|
| **TEMPERATURE AND HUMIDITY SENSOR** | **DHT22** |
| **FLAME SENSOR** | **LM2903** |
| **GAS SENSOR** | **MQ-6** |
| **PIR SENSOR** | **HC-SR 501** |

**WIFI -MODULE -ESPZ8266**

### 4.2 SENSORS INTERFACING MICROCONTROLLER

A sensor is a device that detects changes in the environment and converts stimuli into analog signal, such as heat, light, sound, and motion. A sensor is a device that converts a physical occurrence into an analog signal that can be measured. Our microcontroller analog-to-digital converter (ADC) convert analog signal into a digital signal that can be used for further processing. These signals pass through an interface, which converts them to a binary code and sends it to a microcontroller (computer) for processing. The data is then converted into a human-readable display or

transmitted for reading or processed further. Sensors are input devices that continuously record data around the environment. Our microcontroller continuously processes the data received from the sensors.

## 5. ADVANTAGES AND DISADVANTAGES

### 5.1 ADVANTAGES

1) The probability of human error is greatly reduced.

2) This system provides time and financial savings for the business.

3) Constant monitoring also allows for consistent and dependable data from anywhere around the world.

4) Major accidents can be prevented without any huge damages.

### 5.2 DISADVANTAGES

1) The need for the internet to communicate with the device is necessary and any discrepancy in the network connection may cause delay.

2) The complete range of the sensors is limited and so there is a need for multiple systems to exist for effective monitoring of the whole factory.

## 6. APPLICATION

- Laboratories contain many chemicals, in that many are retractable to high temperatures or heat. So, every lab must contain this detecting of smoke so that vigorous reaction of chemicals with fire can be avoided.
- Refrigeration plants use CFC gases which highly react able with fire, so it is necessary to have this system in the plants.
- It is also used in various other industries like beverage manufacturing, biogas industry.
- Nowadays vehicles also use this system to prevent fire accidents.

## 7. CONCLUSION

By working on this project, we aim to gain in-depth knowledge in the technical aspects of the internet of things and digital electronics systems. The core objective of our industrial monitoring system is achieved with digital integration of sensors with optimum value precision and micro-controllers. We have incorporated sensors for detection of environmental parameters which when reaches undesired condition observed data is communicated to the head center. Arduino UNO is used for processing and allocation of the data received and the processed data is communicated to the internet applications via the internet. Therefore, we have included MQ6 gas sensor, flame sensor, PIR sensor, temperature sensors for receiving data and Arduino for inter-device communications and proposing desired commands. We have also used an internet-based ThingSpeak website for the collection of data. The significance for preventing undesired hazards and activities in the management's absence is the key novelty of our project and we believe it would help industries reduce these accident rates efficiently if deployed. With the ongoing industrial modernization, these days the demand for digital and automation systems to perform functions especially in the information technology and algorithmic sectors has risen exponentially and the application of IoT in their operational mechanisms paves way for development and feasible innovation.

## REFERENCES

[1] Industrial Monitoring and Fault Detection Using Android (Volume: 08 Issue :01|July 2017)

[2] IoT Based Industrial Monitoring and Fault Detection System (Volume: 07 Issue: 06 | June 2020)

[3] Industrial Machine Control and Monitoring System Using IoT (Volume:116 No.21 2017,105-111)

[4] Smart Gas Monitoring System for Home and Industries (Modepalli Kavitha et al 2020 IOP conf.ser.: Mater.Sci.eng.981 022003)