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IOT - ENABLED INDUSTRY MONITORING AND CONTROLLING SYSTEM

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Abstract: Internet of Things (IoT) is rapidly increasing technology The Internet of Things (IoT) is a network of real-world items that have sensors, electronic software, and network connectivity built in them. This permits data collection and exchange between various items . IoT then deals with bringing control of physical devices over the internet. In this project, we are developing a system which will automatically monitor and control the industrial applications and generate Alerts/Alarms or make intelligent decisions using the concept of IoT. A number of sensors are deployed in our project to monitor industrial parameters like temperature, smoke, gas, etc. These parameters were carefully chosen based on the possible risks they pose to the industry machine's regular operation. The sensors used in our project are Temperature sensor, humidity sensor, Flame sensor, smoke sensor and over voltage protection. These sensors will collect their respective data and then send the same data to ESP8266 and will update to the authorized person through the mobile application.

IndexTerms: **IoT, Gas sensor, smoke sensor, flame sensor, Humidity sensor, DHT11, ESP8266, Over voltage protection.**

I.INTRODUCTION

IOT has the ability to alter the world because it can generate data about linked items, evaluate it, and make decisions; in other words, the Internet of Things is smarter than the Internet. It is also commonly utilized in the industrial sector. In the industrial sector, safety and security are given increasing attention, thus to prevent unintentional explosions caused by leakage of various gases, to monitor Temperature, fault load and to control fire accidents we are developing an industrial monitoring system using IoT. This system operates by sounding an alert in the event of a gas leak and indicating the concentration of gas present and the point at which it becomes dangerous. In the interim, it will subtract everyone who enters the room. Unwanted gas leaks and the depth of personnel in enterprises are two major causes of industrial accidents. Leakage of any sort of gases will cause an immense problem in present times system uses an MQ-6 sensor that detects the leakage of LPG, CH4, and CO gases. The primary goal of this project is to create a novel gadget that can safely identify when a factory in danger is malfunctioning and stop the release of flammable gasses, preventing an explosion. The system will also monitor numerous other variables for added protection.

II. EXISTING METHOD:

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 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, and temperature sensors. We have developed a fully autonomous IoT wireless sensor-actuator network for the monitoring of the environment.

III. 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 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.current sensor is used to control the high voltage without causing any effect.

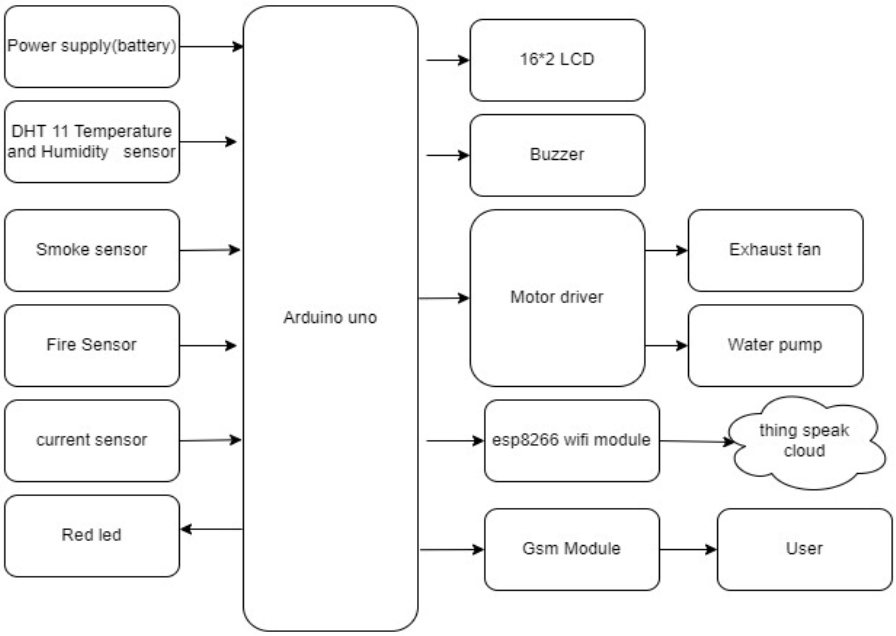

Fig1: Block diagram of IoT based smart industry monitoring and alerting system.

Table1: Sensors and its outputs

INPUT	OUTPUT
Temperature And Humidity Sensor	Buzzer
Gas/Smoke Sensor	Exhauster Fan
Flame Sensor	Water Sprayer
Current Sensor	Bulb Off

IV. HARDWARE COMPONENTS:

DHT11 (Temperature and Humidity sensor) :

The DHT11 sensor is a popular digital temperature and humidity sensor used in various electronic projects and applications. It operates on the principle of capacitive humidity sensing and has a thermistor for temperature measurement.

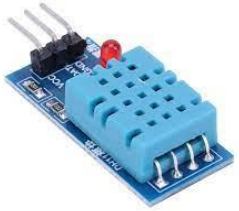

Fig 2: Temperature and Humidity Sensor.

Current sensor (Acs712) :

A current sensor is a device or module used to measure the electrical current flowing through a circuit. It can be analog or digital and comes in various types such as Hall effect sensors, current transformers, and shunt resistors. Current

sensors are essential in monitoring and controlling electrical systems, especially in applications like power distribution, motor control, battery management, and renewable energy systems.

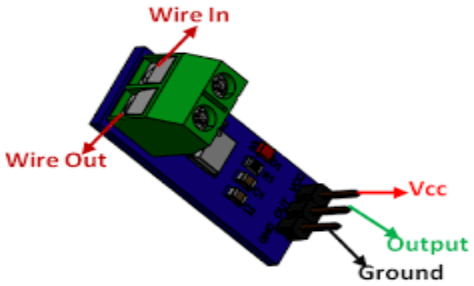

Fig 3: Current Sensor (Acs712)

Smoke sensor (MQ2) :

The MQ-2 smoke sensor is a gas sensor module commonly used to detect various gases in the environment, including smoke, methane, butane, LPG, alcohol, hydrogen, and other flammable gases.

Fig 4: Smoke Sensor (MQ2)

Fire sensor :

A fire sensor, also known as a flame detector or fire detector, is a device designed to detect the presence of fire or flames in its vicinity. These sensors are crucial components in fire alarm systems and play a critical role in early fire detection, alerting occupants, and initiating fire suppression or evacuation procedures.

Fig 5: Fire Sensor

ARDUINO UNO:

The Arduino Uno is a widely popular open-source microcontroller board based on the ATmega328P microcontroller. It was designed for an easy and flexible way to create interactive projects, such as robotics, art installations, and custom sensors. It is low cost and widely used.

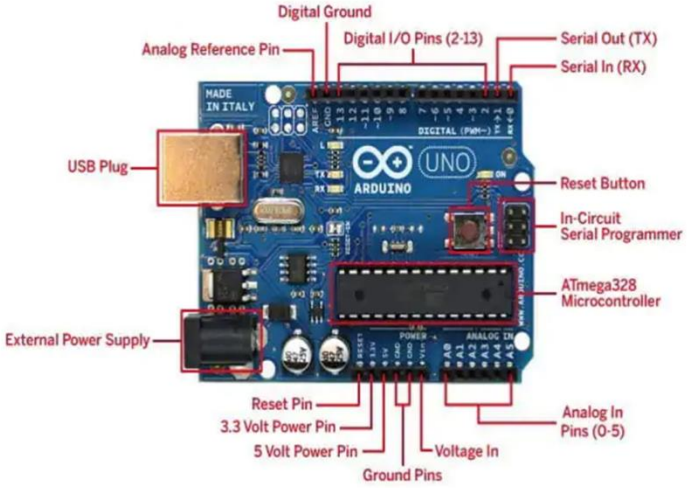

Fig 6: ARDUNIO UNO

LCD 16×2:

These are commonly used in the screen industries to replace the utilization of CRTs. Cathode Ray Tubes use huge power when compared with LCDs, and CRTs heavier as well as bigger. These devices are thinner as well power consumption is extremely less. The LCD 16×2 working principle is, it blocks the light rather than dissipate. This article discusses an overview of LCD 16X2, pin configuration and its working.

Fig 7: LCD 16×2

V. RESULTS AND OBSERVATIONS:

The Prototype of Module – "IoT Based Smart Industry Monitoring and Alerting System" is successfully designed**.** Both the Clouds are synced successively and are connected directly in real-time which are used to monitor, locate and successively alert gas leaks of a complex factory thus, controlling the pollution. The Sensor Values are updated to two server rooms (Factory Server and TNPCB Government Server) and are constantly stored in cloud database using Firebase. Able to monitor and identify the changes. This IOT based Smart Industry Monitoring system gives real-time monitoring Detects Temperature, humidity, level of leaked harmful gases from industrial premises successful Challenge Address. Need an internet connection to access from anywhere in the world without cannot access | Wifi has limited range Speed of the most wireless network Range affected by varies medium and slower than the cable.

The Working Images of the Developed Prototype Model are as follows:

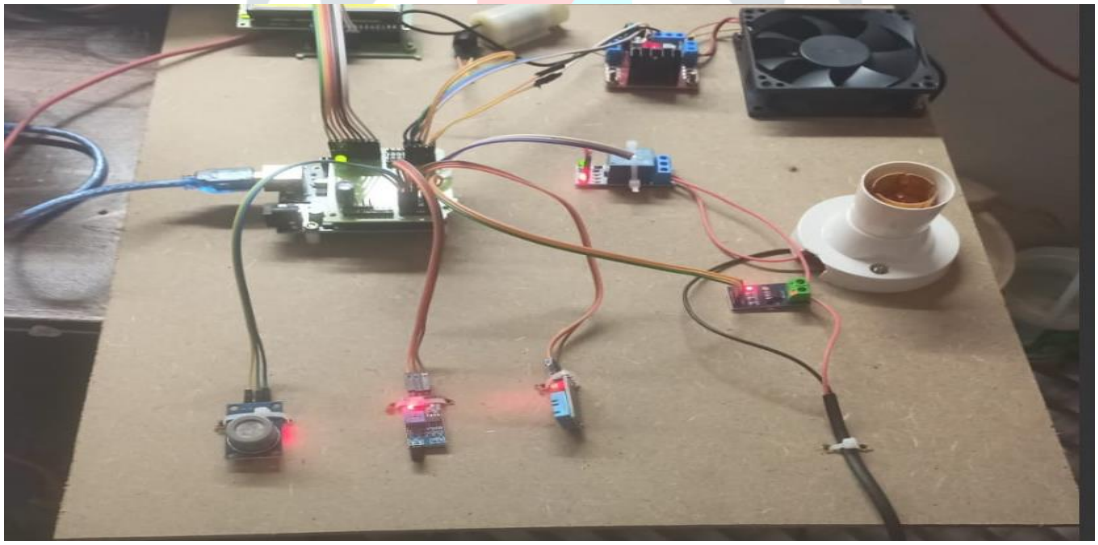

Fig 8: Output Hardware Setup

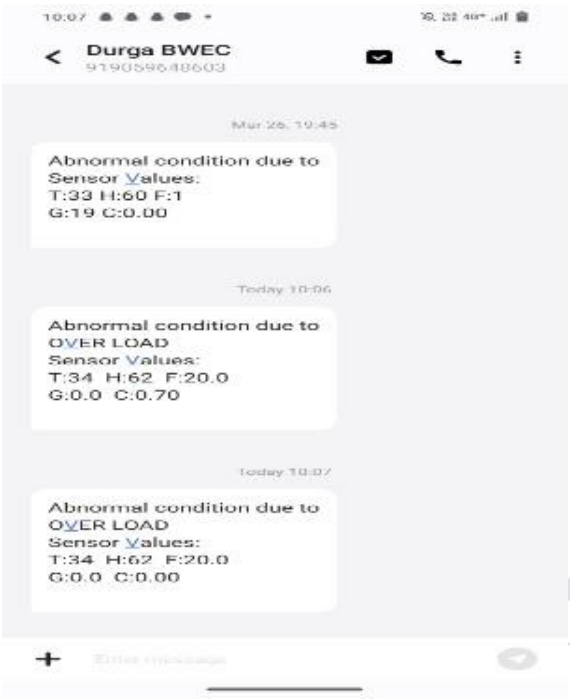

Fig 9 : Message through GSM Module

Fig 10 : Water spray when fire is Detected

Fig 11: Temperature Data

Fig 12: Humidity Data

Fig 13: Gas Data

Fig 14: Fire Data

Fig 15: Current Data

VI. CONCLUSION:

The IoT-based industrial fault monitoring system represents a significant advancement in industrial operations management. By leveraging the power of interconnected devices, sensors, and data analytics, it enables real-time monitoring and detection of faults in industrial equipment and processes. This system provides several key benefits, including improved operational efficiency, reduced downtime, enhanced safety, and better decision-making capabilities for maintenance and repair activities. One of the primary strengths of this system lies in its ability to collect vast amounts of data from various sensors deployed throughout the industrial environment. By analyzing this data using advanced algorithms and machine learning techniques, it can identify patterns, anomalies, and potential faults in equipment and processes before they escalate into more significant issues. This proactive approach to fault detection and maintenance helps minimize downtime, optimize resource.

VII. FUTURE SCOPE:

Integration with Predictive Maintenance: Enhancing the system's predictive capabilities by integrating predictive maintenance algorithms can further improve its effectiveness in identifying and addressing potential faults before they occur. By analyzing historical data and equipment performance metrics, predictive maintenance algorithms can forecast when maintenance is required, optimizing maintenance schedules and reducing unplanned downtime.

Enhanced Data Analytics: Continuously refining and expanding the system's data analytics capabilities can unlock deeper insights into equipment performance, process efficiency, and fault patterns. This may involve incorporating advanced analytics techniques such as anomaly detection, trend analysis, and root cause analysis to enhance fault detection accuracy and reliability.

REFERENCES:

[1] Industrial Machine Control and Monitoring System Using IoT (Volume:116 No.21 2017,105-111) [7] Smart Gas Monitoring System for Home and Industries (Modepalli Kavitha et al 2020 IOP conf.ser.: Mater.Sci.eng.981 022003)

[2] Akatsu K. and Kawamura A., "Sensor less very low and zero speed estimations with on-line secondary resistance estimation of induction motor without adding any signal, IEEE Ind. Applicant. Soc. Annual. Meeting, pp187-193

[3] D. S. Ghataoura, J. E. Mitchell, and G.E. Matich, "Networking and application Interface technology for wireless sensor network surveillance and Monitoring," IEEE Commune. Mag., vol. 49, no. 10, pp. 90–97.

[4] Kavitha.B.C, Vallikannu.R . IoT based intelligent industry monitoring system. International Conference of Signal Processing and Integrated Networks, 2019

[5] K Keshamoni and S Hemanth 2017 Smart gas level monitoring, booking & gas leakage detector over iot Proc. - 7th IEEE Int. Adv. Comput. Conf. IACC 2017, pp. 330–332

[6] D Spirjakin, A M Baranov, and V Sleptsov 2015 Design of smart dust sensor node for combustible gas leakage monitoring Proc. 2015 Fed. Conf. Comput. Sci. Inf. Syst. FedCSIS 2015, vol. 5, pp. 1279–1283, 2015

[7] Anil H. Sonune, S.M.Hambarde,-" Monitoring and Controlling of Air Pollution Using Intelligent Control System",- International Journal of Scientific Engineering and Technology ISSN: 2277- 1581,Volume No.4 Issue No5, pp: 310-313.

[8] Nikheel A. Chourasia, Surekha P. Washimkar," ZigBeeBased Wireless Air Pollution Monitoring" International Conference on Computing and Control Engineering (ICCCE 2012), 12 & 13 April, 2012.

[9] A Boubrima, W Bechkit and H Rivano, "A new WSN deployment approach for air pollution monitoring", *2017 14th IEEE Annu. Consum. Commun. Netw. Conf. CCNC 2017*, pp. 455-460, 2017.