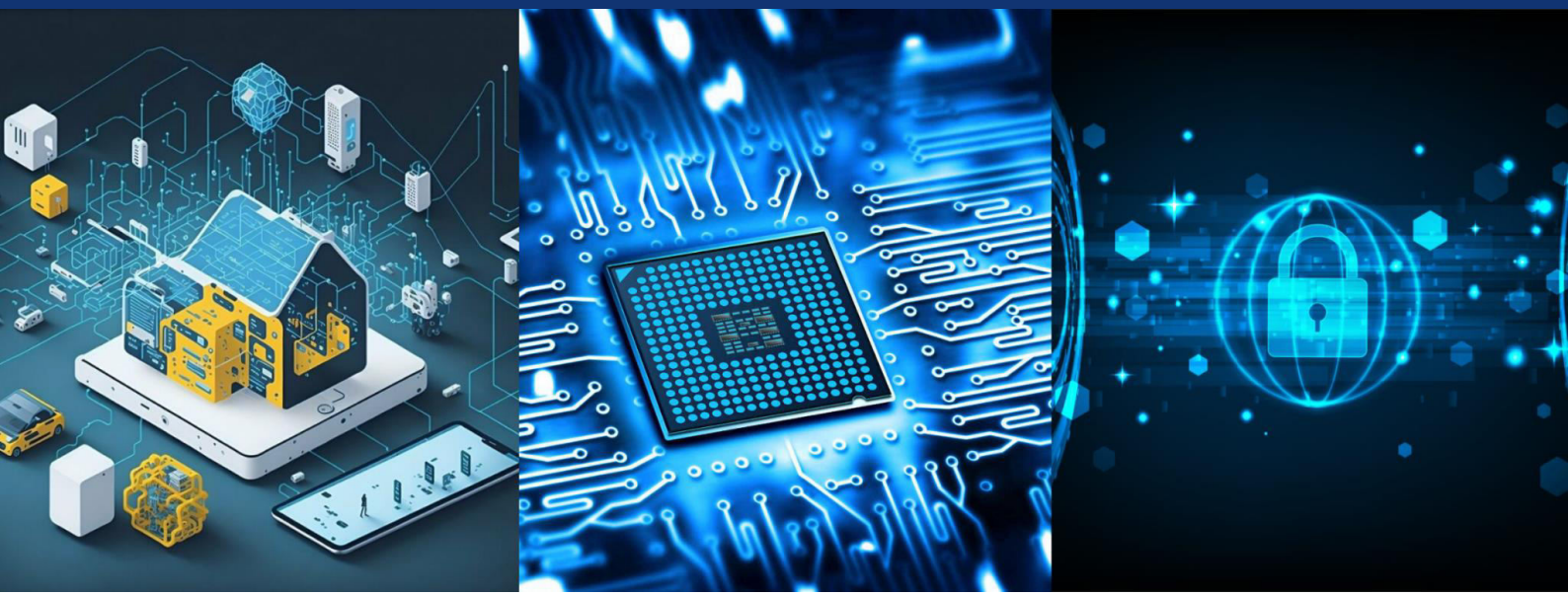
IJIRCCE

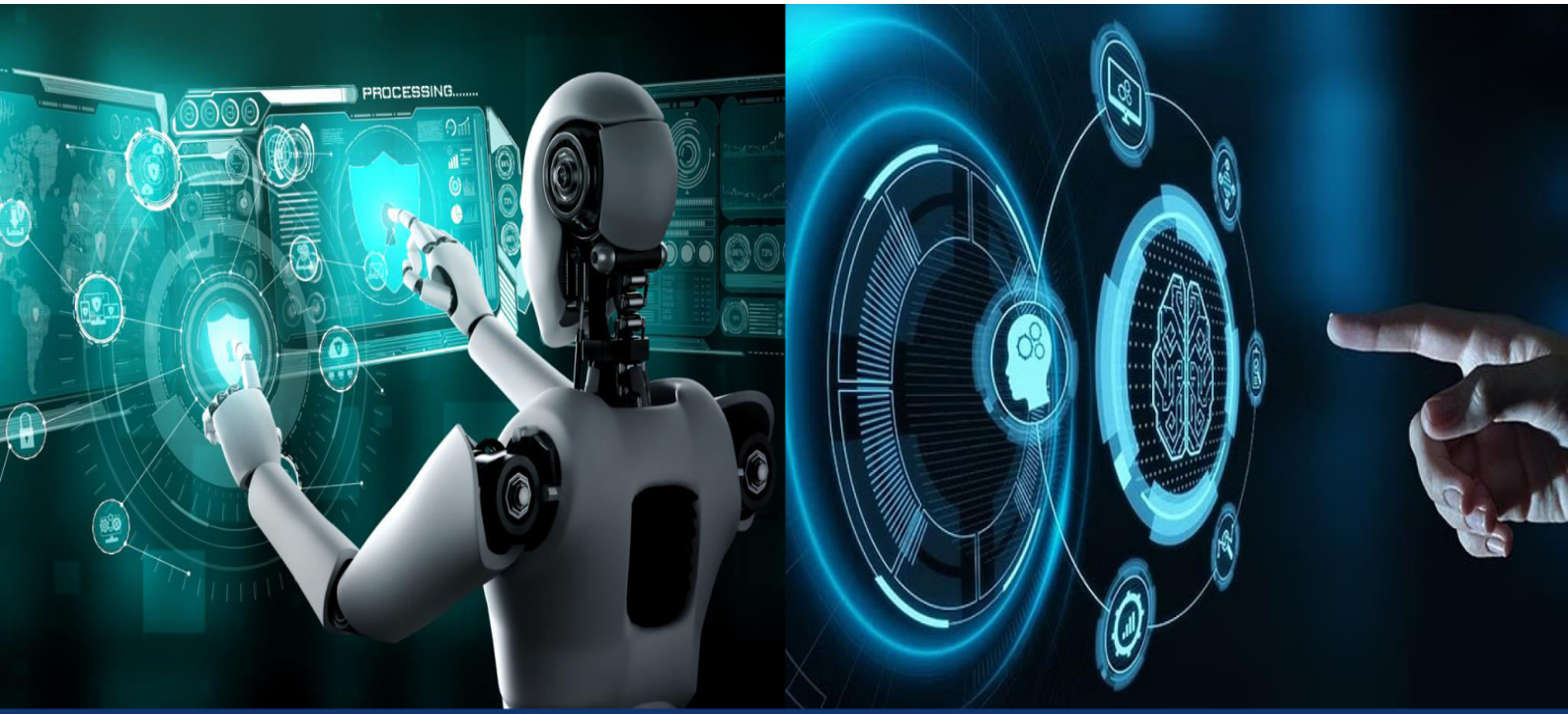
ISSN(O): 2320-9801

ISSN(P): 2320-9798



International Journal of Innovative Research in Computer and Communication Engineering

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.625

Volume 13, Issue 1, January 2025

© 2025 IJIRCCE | Volume 13, Issue 1, January 2025| DOI: 10.15680/IJIRCCE.2025.1301026

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

IOT-based Industrial Safety Monitoring and Alert System using Arduino

Soumya B S[1], Advaith A[2], Likith B R[3], KVS Bharadwaj Reddy[4], Yashwanth H L[5]

Assistant Professor, Department of EIE, Dr. Ambedkar Institute of Technology, Karnataka, India [1]

Student, Department of EIE, Dr. Ambedkar Institute of Technology, Karnataka, India[2]

Student, Department of EIE, Dr. Ambedkar Institute of Technology, Karnataka, India[3]

Student, Department of EIE, Dr. Ambedkar Institute of Technology, Karnataka, India[4]

Student, Department of EIE, Dr. Ambedkar Institute of Technology, Karnataka, India[5]

ABSTRACT: This project describes an IoT-based industrial safety monitoring and alert system in the context of enhancing the efficiency and safety of the boiler system in any industry. This proposed system will utilize sensors, Arduino boards, and cloud connectivity to monitor the parameters of boilers-like temperature, pressure, and levels of gases in real time. Anomalies are detected, and notifications are issued to operators and maintenance personnel by mobile phone applications. This makes it scalable, cost-effective, and an able solution for real-time monitoring for industries looking at enhancing boiler safety and efficiency. The proposed system has a huge potential for accident prevention, reduction of downtime, and minimization of environmental hazards in enhancing the overall safety and reliability of industrial boiler systems.

KEYWORDS: Industrial boiler systems, IoT technology, Real-time monitoring, Arduino, Sensors, Cloud connectivity, Industrial safety.

I. INTRODUCTION

Industrial boiler systems are the backbone of the manufacturing industry, power generation, and processes. These systems ensure heat and steam supplies in various industrial processes, and thus, modern industries cannot do without them. However, if not closely monitored and maintained, boiler systems pose serious hazards to personnel, equipment, and environment.

Boilers present severe hazards to personnel, including burns, explosions, and exposure to toxic gases. Economic losses due to equipment damage and downtime are also quite common in the case of boiler malfunctioning. Air and water pollution can result if boiler systems are not operated within the limits of safe operation. The traditional monitoring of boilers involves many manned activities and periodic routines, which may be time-consuming and subject to human errors.[1],[3] IoT technology has now made it possible to build real-time monitoring systems with an enhanced capability for detecting anomalies by triggering alerts in real time.

A Boiler-based IoT-enabled Industrial Safety Monitoring and Alert System was designed and developed using an [1],[2],[3] Arduino. The proposed system, in turn, depends on sensors,[1],[2] Arduino boards, and cloud connectivity for the real-time monitoring of boiler parameters and detection of anomalies that trigger alerts.The proposed system is promising for improving industrial boiler systems in terms of safety, efficiency, and reliability. This system will help prevent accidents, reduce downtime, and minimize hazards to the environment through real-time monitoring and alerts. Thus, scalability and cost-effectiveness provide attractive solutions for industries to improve boiler safety and efficiency.

II. LITERATURE REVIEW

[1] On June 2021 the author Shubham Banerjee, ET AL proposed “Development of An Internet of Things (IOT) Based Industrial Security and Safety System Using Arduino”. The project targets the design of an IoT-based industrial safety

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

monitoring system. It uses sensors for temperature, fire, gas leakage, and light intensity, all of which operate in an integrated manner for real-time data collection and analysis. The system generates alerts or takes precautionary measures to avoid accidents related to gas leaks, fires, or insufficient lighting. Based on an Arduino-based architecture, the system undertakes all the proactive measures necessary to reduce industrial risks and losses in case of emergencies.

[2] On June 2020 the author Prajwala Gavuji, ET AL proposed "Industrial Safety System using Internet of Things". This research work focuses on industrial safety to minimize fire and gas leakage risks that can occur in industries such as petroleum and chemicals. It operates with an Arduino UNO equipped with flame sensors, MQ-7 for the detection of CO, MQ-2 for smoke and methane, DHT-11 for temperature and humidity, and LDRs for light intensity. In the proposed system, a GSM module sends messages and calls to authorized personnel during emergencies. These sensors provide continuous data to the microcontroller, which then processes and responds on time for safety.

[3] On May 2020 the author S. Sujitha, ET AL proposed "IOT Based Smart Mine Safety System Using Arduino". The project presents an IoT-based mine safety system to improve worker safety and reduce mining accidents. Parameters such as temperature, humidity, light intensity, gas, and flame traces were continuously monitored using sensors, and the data were processed using an Arduino UNO. If the values exceeded the threshold, alerts were sent to the control room and a buzzer sounded to warn the workers at the site. An RF transmitter monitors worker movements, while a Wi-Fi module enables online data access. The sensor readings were displayed on a ThingSpeak platform for real-time monitoring and analysis.

[4] On March 2024 the author Sanyukti Gaikwad, ET AL proposed "Industrial Safety Application Using Arduino (UNO R3)". This project aims to reduce industrial losses and accidents due to fire outbreaks, gas leakage, or low light in industries related to petroleum and chemicals. Safety based on IoT uses Arduino with temperature, gas, and light sensors to detect hazards and prevent mishaps. In real time, the sensor data are processed and displayed on an LCD screen. When these values exceed the threshold level, an alert is triggered. It provides timely notifications to authorities and increases workplace safety. This solution is effective in reducing risks and minimizing industrial losses.

[5] On July 2022 the author K Jeevan Reddy, ET AL proposed "IOT Industrial Monitoring and Controlling System". Gas leakage in homes and industries is a major risk, usually left unnoticed due to human error. This study proposes an IoT-based system with sensors and controllers for monitoring LPG gas leakage and other hazards. The different sensors used in this setup are DHT22, MQ6, LM2903, and HC-SR501, which detect parameters such as the temperature, humidity, gas, and flame. The collected data were processed using a Wi-Fi module (ESP8266) for real-time monitoring and alerts. This system offers an effective solution for disaster prevention through detection and notification at due time.

III. METHODOLOGY

A. Hardware

1. Arduino Mega 2560 Rev3

Arduino Mega 2560 Rev 3 is a powerful microcontroller board based on the ATmega2560. The board contained 54 digital I/O pins, 16 analog inputs, and four UARTs. It operates at a voltage of 16 MHz, has sufficient memory, and supports a large number of shields, making it perfect for more complex IoT and automation projects. The board provides USB programming and includes a reset button.

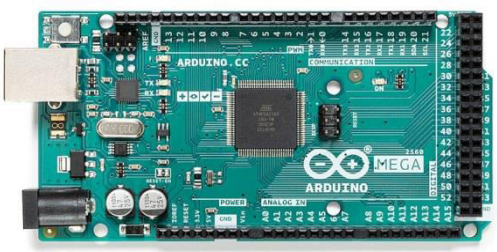


Fig.1: Arduino Mega 2560 Rev3

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

2. ESP32

ESP32 is a versatile microcontroller with built-in Wi-Fi and Bluetooth, which is excellent for IoT projects and projects that require wireless communication. It has a dual-core processor, a greater number of GPIOs, support for ADC/DAC, and advanced features, including low power consumption modes. Their high performance and wide variety of sensors and peripherals make them suitable for a broad range of applications.

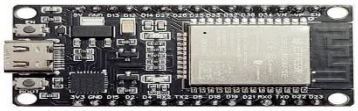


Fig.2: ESP32

3. RFID Card Reader

An RFID card reader is an apparatus that reads data in RFID tags or cards by means of radio frequency communications. It consists of an antenna and a reader module, realizing noncontact identity recognition and information transmission. The most frequent applications relate to access control, inventory, and payment systems, which enable high speeds with security.

Fig.3: RFID Card Reader

4. Servo Motor

The servo is a small, accurate motor with an integrated control circuit for the exact position, speed, and torque. It uses pulse-width modulation (PWM) signals to drive it within a certain rotating angle, usually within 0-180 degrees. It is a popular device in robotics, automation, and IoT because of its reliability and high efficiency.

Fig.4: Servo Motor

5. DHT11

DHT11 is a digital temperature and humidity sensor that comes at a low cost and provides readings within the range of 20-90% humidity and 0-50°C temperature. Communication with microcontrollers is accomplished via a single-wire data protocol; thus, interfacing becomes difficult with systems such as Arduino. Owing to its simplicity, it has wide applications in weather monitoring, IoT, and home automation projects.

© 2025 IJIRCCE | Volume 13, Issue 1, January 2025| DOI: 10.15680/IJIRCCE.2025.1301026

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Fig.5: DHT11

6. Flame Sensor

Flame sensors can detect the presence of flames because of the infrared or ultraviolet radiation emitted by the fire. They are generally used in fire detection systems to trigger alarms or automatic shutdowns when the flames are recognized. They provide a fast response and reliable output that are also widely used for industrial and safety applications.

Fig.6: Flame Sensor

7. MQ135 Air Quality

MQ135 is a sensor that detects ammonia, carbon dioxide, benzene, and smoke. It provides an analog signal whose level varies with the concentration of the gas in the air. This sensor is typically used for environmental monitoring because of its ability to measure the level of pollution in indoor air.

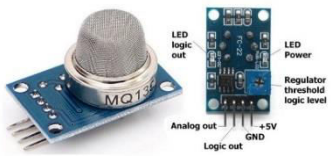


Fig.7: MQ135 Air Quality

8. Vibration sensor

The vibration sensor detects oscillations or vibrations within its environment and converts them into an electrical signal. It is usually applied in machinery monitoring, movement detection, or sensing any kind of physical disturbance. These sensors are widely used in various applications such as security systems, industrial applications, and structural health monitoring

Fig.8: Vibration Sensor

9. Touch Sensor

A touch sensor detects physical touch or proximity to a surface by measuring the changes in capacitance or resistance. Large applications are commonly found in several devices related to user interfaces, ranging from mobile phones to

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

smart home applications. These sensors offer an inexpensive and reliable interface to electronic systems with minimal or no mechanical switches.

Fig.9: Touch Sensor

10. RGB LED & WHITE LED

An RGB LED is a type of multicolour light-emitting diode that encompasses red, green, and blue LEDs to form almost any colour by adjusting their brightness. A white LED emits light in the visible spectrum, which is produced by a blue LED mostly coated with a phosphor material to generate white light. Both types are energy-efficient and widely used in displays, lighting, and decorative applications.

a. b.

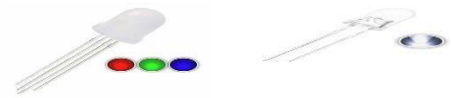


Fig.10: a. RGB LED, b. WhiteLED

11. OLED Display

An OLED display uses organic compounds to emit light when an electric current passes through it. Brilliant colours with high contrast are the results. It does not require any backlight; hence, it is thinner and more energy efficient than other types of displays. The common use of OLED displays in small screens in modern times has been in smartphones, wearables, and IoT projects.

Fig.11: OLED Display

12. 5V Fan

A 5V fan is a small, low-power cooling device operating on a 5-volt DC power supply. It is normally used in electronic projects, including cooling components, such as microcontrollers and Raspberry Pi boards. Owing to its compact size and efficient energy consumption, it is ideal for applications in which space and power limitations exist.

Fig.12: 5V Fan

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

13. Relay Module

The relay module is an electrically operated switch that allows low-voltage circuits to control the high-voltage devices. the 5V relay module is used for interfacing microcontrollers, such as Arduino, to external devices, which could be a motor, lamp, or appliance. It includes a 5V relay, driving transistor, and protective diodes for safe operation.

Fig.13: Relay Module

14. Buzzer

A buzzer is an electromechanical device that generates sound through the action of an electrical signal. It finds wide applications in alarms, notifications, and signaling devices to warn users against the occurrence of a certain event or condition. Buzzers are available in different types, including piezoelectric and electromagnetic, each offering different characteristics regarding sound and power requirements.

Fig.14: Buzzer

15. Battery

A battery is an electrochemical device that stores electrical energy in the form of chemical energy and converts it back to electrical power when needed. A typical battery consists of at least one voltaic cell with positive and negative terminals. Battery applications include electronic gadgets, vehicles, and backups.

Fig.15: Battery

B. Software

1. Arduino IDE

The Arduino Integrated Development Environment is a software that assists in writing, compiling, and uploading codes to Arduino boards. It supports the C and C++ programming languages and presents a simple interface for beginners and advance users. The IDE also offers multiple libraries and tools to facilitate coding and debugging of Arduino-based projects.

2. Arduino Cloud

Arduino Cloud is an online platform that allows users to connect their Arduino devices to the internet, enabling remote monitoring and control. It provides tools for creating IoT projects, integrating sensors, and automating tasks using a web-based interface. Users can store data, create dashboards, and interact with their devices securely anywhere.

© 2025 IJIRCCE | Volume 13, Issue 1, January 2025| DOI: 10.15680/IJIRCCE.2025.1301026

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

IV. WORKING

A. Block Diagram

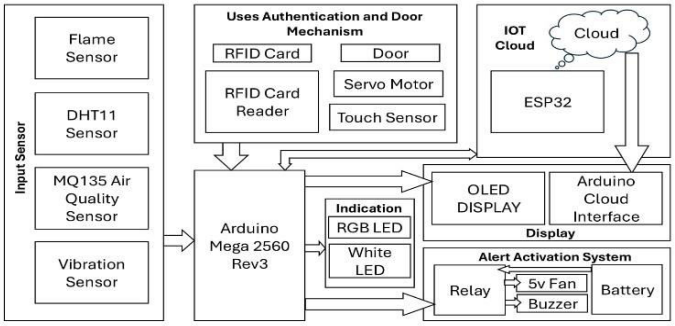


Fig.16: Block Diagram for "IoT-based industrial safety monitoring and alert system"

B. Circuit Diagram

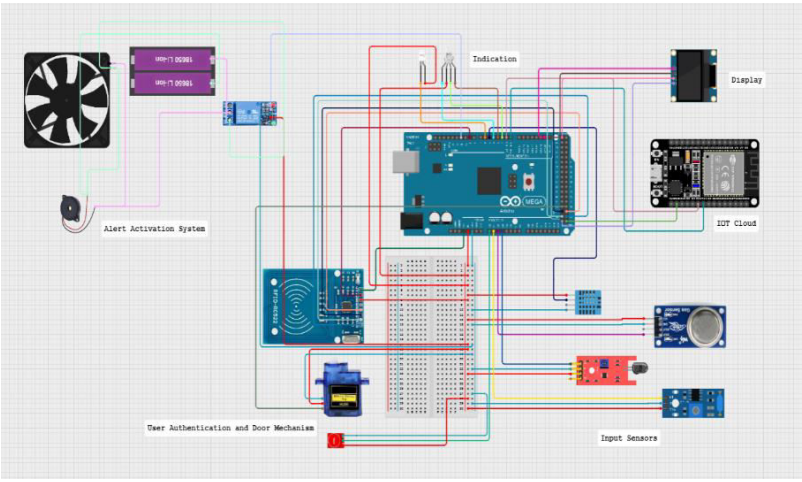


Fig.17: Internal Circuit Diagram for "IoT-based industrial safety monitoring and alert system"

© 2025 IJIRCCE | Volume 13, Issue 1, January 2025| DOI: 10.15680/IJIRCCE.2025.1301026

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

C. Flow Chart

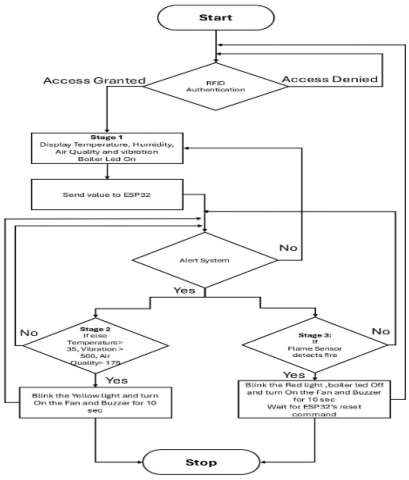


Fig.18: Flowchart for "IoT-based industrial safety monitoring and alert system"

The IoT-based Industrial Safety Monitoring and Alert System Using Arduino in Boilers allows secure access to the boiler system by integrating RFID user authentication. The authorized persons are provided with RFID tags that, when the authorized person approaches the boiler system, are read through an RFID reader module, RC-522. Then, the RFID data were further transmitted to the Arduino Mega Board for verification.

In return, the Arduino board receives authorized signals from the user and triggers sensor data acquisition. Temperature, pressure, and gas sensors collect data from the boiler and send it to the Arduino Mega Board as shown in the fig:16. Board processing of the incoming sensor data was performed by checking the threshold values. If the received data is higher than the threshold value, the board is alert.

This alert was sent to the ESP32 module module as shown in fig:17, which in turn sent it to the cloud platform. Furthermore, the cloud platform sends notifications to the operators and maintenance personnel to take necessary corrective actions for the control of the boiler system and to prevent accidents. This enables remote monitoring and control; hence, operators can receive real-time updates on the status of the system.

The relay module drives the fan and buzzer according to sensor data. Once the sensor data crosses the threshold value, the relay module triggers a fan and buzzer to alert the personnel. Such a system can provide a secure and power-efficient way to monitor or control industrial boiler systems, which in turn safeguards personnel from potential dangers or equipment hazards.

This system integrates RFID user authentication with the IoT technology, resulting in a more secure and efficient system. It is economically effective for industrial safety monitoring and control, and easy upscaling or downscaling can be performed according to industrial requirements.

RESULT

The IoT-based Industrial Safety Monitoring and Alert System ensured the safety of the industrial boiler. It correctly initializes and authenticates only authorized persons with the help of RFID. The connected sensors collect data and send them to the Arduino board, which further displays alerts when the threshold value is crossed. The alerts were successfully forwarded to the cloud platform so that remote monitoring and control could be performed. Hence, a safe and efficient industrial boiler system was developed.

© 2025 IJIRCCE | Volume 13, Issue 1, January 2025| DOI: 10.15680/IJIRCCE.2025.1301026

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

A. OLED Display Output

a. b. c.

Fig.19: Authentication, a. asking the user to scan the card display, b. access granted display, c. access denied.

The authentication process identify weather the authorised person will get access to the boiler room based on the RFID card.

a. b. c.

Fig.20: Door Mechanism, a. door open status, b. user id display, c. door close status.

a.

b. c.

Fig.20: Alert Mechanism, a. Stage1: normal, b. Stage2: alert, c. Stage 3: fire alert.

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

The above fig.20(a) displays the data that are temperature, humidity, air quality and vibration based on the sensor values this data representation is given as stage1. Stage2 and Stage3 give the alert based on the exceeding of the threshold values and flame detected as the fig20(b)(c) respectively.

Stage 1	Stage 2	Stage 3
The temperature, humidity, Air Quality and vibration value are normal in this stage as it gives an safety environmental conditions for the works.	In stage 2 the threshold values are set according to the worker's working environment and considering WHO standards. Threshold values: Temperature: >35°C Air Quality: >175ppm Vibration: > 500 Humidity: 30-75%(safe range)	This stage activates only if their is any kind of fire alert inside the boiler which could cause a hazardous condition.

Fig.22: Different stages of Alert System

B. Arduino Cloud & Google Sheets Output

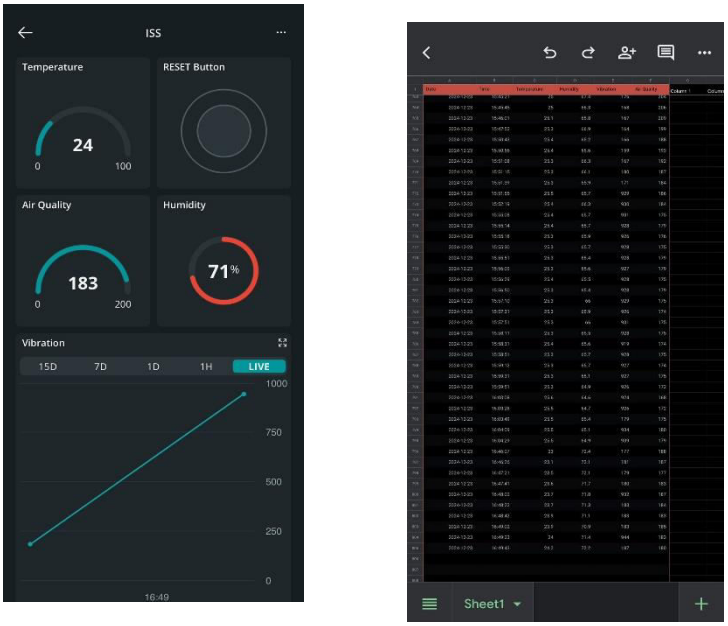


Fig.21: a. Arduino cloud display, b. Google sheets display.

V. RESULT

1. Scaling the System to Other Industrial Equipment for Monitoring and Control: The system will be extended to monitor more industrial equipment, such as conveyor belts, pumps, and valves, in order to develop an integrated industrial safety monitoring system.

2. Computer Vision: The computer vision technology can be added to visually inspect the boiler system and the surrounding area for increased safety and security.

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

3. Mobile Applications: An application developed for the operator and maintenance personnel monitors the system, sends quick messages to them, and will allow them to have an ability to control the boiler from a distance. Thus it makes response times easier and faster.

4. Integration with SCADA Systems: Smother and more comprehensive industrial safety monitoring would be ensured by integration with the current SCADA systems.

VI. FUTURE SCOPE

1. Scaling the System to Other Industrial Equipment for Monitoring and Control: The system will be extended to monitor more industrial equipment, such as conveyor belts, pumps, and valves, in order to develop an integrated industrial safety monitoring system.

2. Computer Vision: The computer vision technology can be added to visually inspect the boiler system and the surrounding area for increased safety and security.

3. Mobile Applications: An application developed for the operator and maintenance personnel monitors the system, sends quick messages to them, and will allow them to have an ability to control the boiler from a distance. Thus it makes response times easier and faster.

4. Integration with SCADA Systems: Smother and more comprehensive industrial safety monitoring would be ensured by integration with the current SCADA systems.

VII. CONCLUSION

An IoT-based Industrial Safety Monitoring and Alert System is the best and most reliable solution to ensure industrial boiler safety. In this system, real-time monitoring and warning will provide scope for the early action and prevention of accidents. The use of RFID-based user authentication provides additional security to the proposed system. Generally, it enhances industrial boiler safety, efficiency, and reliability.

REFERENCES

1. Shubham Banerjee, Sandipta Mondal, Arnab Jyoti Mandal, Prakash Banerjee, “Development Of An Internet Of Things (IOT) Based Industrial Security And Safety System Using Arduino,” in American Journal of Engineering Research (AJER) 2021, e-ISSN: 2320-0847 p-ISSN 2320-0936, Volume-10, Issue-6, pp-99-107.
2. Prajwala Gavuji, Niharika Kaza, “Industrial Safety System using Internet of Things,” in International Journal of Scientific Research & Engineering Trends Volume 6, Issue 3, May-June-2020, ISSN (Online): 2395-566X.
3. S.Sujitha; Dr. J. B. Shajilin Loret; Mrs. D. Merlin Gethsy, “IOT Based Smart Mine Safety System Using Arduino,” in International Journal of Computer Science and Mobile Computing, IJCSMC, Vol. 9, Issue. 5, May 2020, pg.141 – 145.
4. Prof. C.M. Maind1, Sanyukti Gaikwad2, Om Desai3, Mrunali Birdawade4, Gaurav Devkate, “Industrial Safety Application Using Arduino (UNO R3)”,in International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538 Volume 12 Issue III Mar 2024- Available at www.ijraset.com.
5. K. Krishna Reddy1, K Jeevan Reddy2. G Rajeswari3, K Tejo Rani4, K Kalyan Kumar5, M Lakshmaiah6, B Harshavardhan7, “IOT Industrial Monitoring and controlling System” in International Journal of Mechanical Engineering, Vol. 7 No. 7 July, 2022.
6. Surya Prakash Sharma*1, Prof. S.K. Srivastava*2, “Iot- Based Industrial Fault Monitoring System” in International Research Journal of Modernization in Engineering Technology and Science, Volume 4, Issue 8, August 2022.
7. https://www.geeetech.com/wiki/index.php/Arduino_Mega_2560?srsltid=AfmBOor3xXAmIX3NUdwZ6mtge5v5TFWSJFSSntGtT6zAkNnt_14sdnn9
8. http://wiki.sunfounder.cc/index.php?title=Humiture_Sensor_Module
9. https://www.waveshare.com/wiki/MQ-135_Gas_Sensor

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

10. https://forum.arduino.cc/t/target-impact-with-vibration-sensor-sw-420/1160893
11. https://en.m.wikipedia.org/wiki/Flame_detector
12. https://en.m.wikipedia.org/wiki/ESP32
13. https://en.m.wikipedia.org/wiki/Light-emitting_diode
14. https://www.techtarget.com/iotagenda/definition/RFID-radio-frequency-identification

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INNO SPACE SJIF Scientific Journal Impact Factor

doi crossref

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details