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INDUSTRIAL CENTRALIZED CONTROL AUTOMATION SYSTEM USING IOT BASED EMBEDDED SYSTEM

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ABSTRACT

Industry Protection System represents an advanced IoT-based framework aimed at bolstering industrial safety through the real-time detection of fire and gas leaks. Our research focuses on developing a microcontroller-driven system for gas detection, complemented by flame sensors for fire monitoring and thermistors for precise over-temperature detection. The microcontroller continuously processes sensor data, which is transmitted securely in real-time to a cloud-based server via a Wi-Fi module using the HTTP communication protocol, enabling remote monitoring and management. The system integrates proactive alert mechanisms, improving response times to potential hazards. Data visualization is provided through a website and a mobile app. An exhaust fan is automatically activated to cool the environment when the temperature exceeds a predefined threshold. The system also features an LCD for on-site data display, a buzzer for alerts, a water pump for automated fire response, and relays for load control during incidents. A touch sensor allows manual control in case of automatic system failures.

I. INTRODUCTION

Over the past three decades, between 1990 and 2020, 237 fatal incidents occurred across 4,560 Bangladeshi garment factories, with 94\% caused by fires, 3.38% by boiler explosions, 1.27% by building collapses, and 1.27% by other factors. These incidents resulted in 6,870 casualties, including 5,181 deaths and 1,689 injuries. The highest toll occurred between 2011 and 2015, when 3,800 people were injured, and 1,287 lost their lives [1]. On June 4, 2022, a fire at the BM Inland Container Depot in Sitakunda, Bangladesh, caused over 48 deaths, including 10 firefighters, and injured 200 others. It took 86 hours to extinguish, with financial losses exceeding [2]. A survey of Old Dhaka's Small-Scale Industries found that 75% of workers lack protective gear, 60% of factories have no emergency plans, and only 18% of workers receive proper job training, raising critical safety issues [3].

Previous research has focused separately on gas leakage detection, temperature monitoring, smoke detection, and fire detection. In [4], the author developed an IoT-based system utilizing an Arduino UNO R3 with an ESP8266 Wi-Fi module for internet connectivity. The system incorporates an MQ-6 gas sensor for leak detection, an LM35 temperature sensor for thermal monitoring, and a buzzer for alerts. Sensor data is transmitted to the ThingSpeak server, enabling real-time monitoring and device control. The proposal in [5] introduces a system that utilizes the GSM-based system for detecting industrial faults like temperature spikes, overvoltage, and gas leaks. It triggers a buzzer and sends wireless alerts to the authority when thresholds are exceeded.

In [6], the system uses flame and gas sensors to detect fires and gas leaks, preventing industrial accidents. It monitors temperature, phase faults, and voltage, transmitting data online via Wi-Fi, and the GSM module sends alerts if operators are offline. In [7], the author developed IoT-based fire detection and control system that utilizes a NodeMCU, along with smoke, temperature and MQ2 sensors to assess fire severity. It sends real-time alerts and notifications via the Blynk cloud while automatically activating sprinklers and extinguishers. The proposal in [8], the authors developed a smart fire detection system that uses NodeMCU, temperature, smoke, flame, LDR, and MQ2 sensors to assess fire severity. It transmits real-time alerts and activates sprinklers and extinguishers via the Blynk cloud upon flame detection. In [9], the author developed a system that uses MQ2, MQ7, and MQ135 gas sensors strategically placed throughout the industrial facility to monitor various gases. The sensors send real-time data to a centralized controller, enabling authorized personnel to access information remotely and take prompt action from anywhere with an internet connection. The research in [10] presents a Safety Monitoring System for the cracker industry that integrates a DHT11 sensor for temperature and humidity, gas sensors for hazard detection, and the KNN algorithm to analyze historical data for predicting safety risks.

In [11], the authors developed a fire detection system that uses an Arduino and a flame sensor to monitor heat intensity in homes and offices. The system alerts users with a buzzer and transmits messages to a virtual terminal via a Wi-Fi module. In [12], the authors developed a system to monitor temperature, pressure, humidity, and gas concentration. These sensors transmit real-time data to a centralized monitoring system, and using GSM, the system sends automated SMS alerts to designated personnel when deviations occur. The authors developed a system in [13] that uses sensors connected to a Raspberry Pi 3 for continuous monitoring. A temperature rises triggers SMS alerts, image capture, emails to the fire station, buzzer activation, and webpage updates, while similar alerts are issued for gas or smoke detection and high humidity. In [14], the research introduces a fire detection system that uses multiple sensors and a camera connected to a Raspberry Pi 3 to identify affected areas.

To reduce false alarms, it validates fire alerts by sending an image and a message. If confirmed, the system quickly notifies the local fire department. In [15], the authors developed a hybrid system for detecting fires, gas leaks, and noise pollution. Using a Raspberry Pi with sensors and a servo-mounted camera, it identifies affected areas, sends alerts via LAN, and triggers alarms. If confirmed, the system opens the water valve and notifies the fire brigade. The authors developed a building safety system in [16], which monitors fire, smoke, and temperature throughout the building, sending real-time data to Firebase. It alerts users via an Android app with live location updates, notifies emergency services, provides safe exit routes, and triggers a manual alarm to warn occupants. In [17], the authors developed a system that detects fire using a flame sensor, gas leaks via a gas sensor, and intrusions with a PIR sensor, alerting workers in real-time. If an intruder triggers a fire, the system captures an image and sends instant alerts via message and email. In [18], the authors developed an IoT-based fire prevention and response system using Arduino Uno and Raspberry Pi B+, along with gas, smoke, and temperature sensors. The system sends data to a server for SVM-based validation, triggering alerts to authorities if anomalies are detected. In [19], the authors developed an automated fire monitoring system that employs the nRF24L01 module for long-range data transmission, making it suitable for industrial use.

Most previous research emphasizes gas and fire detection, but often misses automatic water spray activation upon fire detection and proper monitoring systems. In addition, integration of cooling system activation and automatic load control remains unaddressed, leaving significant gaps in industrial safety solutions. Our research addresses the gaps in previous studies by developing a smart, automated industrial safety solution. The system uses gas, fire, motion, temperature and optical sensors to monitor conditions, with an LCD display for onsite data display and a buzzer for alerts. It includes an exhaust fan for cooling, a water pump for automatic fire response, and relays for load control during incidents. A touch sensor enables manual control if automatic functions fail. Data are transmitted from the transmitter to the receiver through the HTTP communication protocol. In the receiver section, system operations are monitored through a micro-controller, and a GSM module is used for SMS and onsite data availability during power crises. Data are received from the transmitter via the HTTP communication protocol. Data are monitored through website and mobile app visualization. The system sends alerts via email and SMS notifications when a fire incident occurs.

II. METHODOLOGY

This research focuses on developing an Industrial Centralized Control System with an emergency alert. This section details the circuit diagram, data transmission, and onsite mobile network connectivity.

II.1 SYSTEM BLOCK DIAGRAM

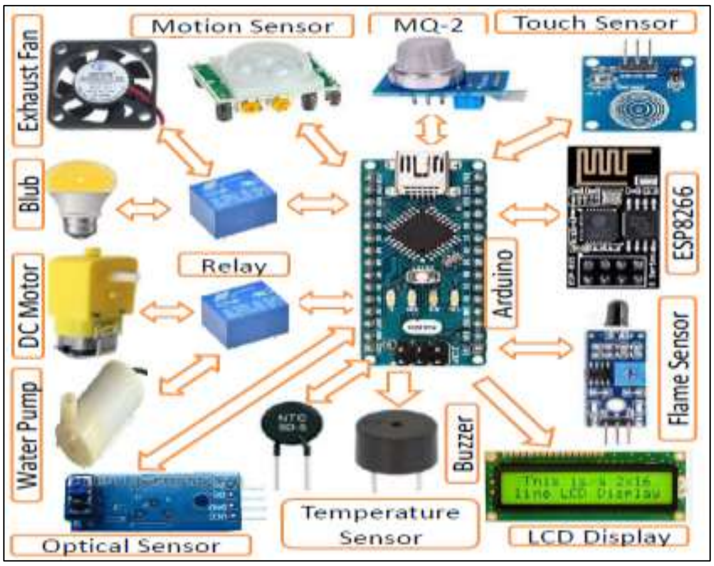

Figure 1: Block diagram of the Project (Transmitter).

Source: Authors, (2025).

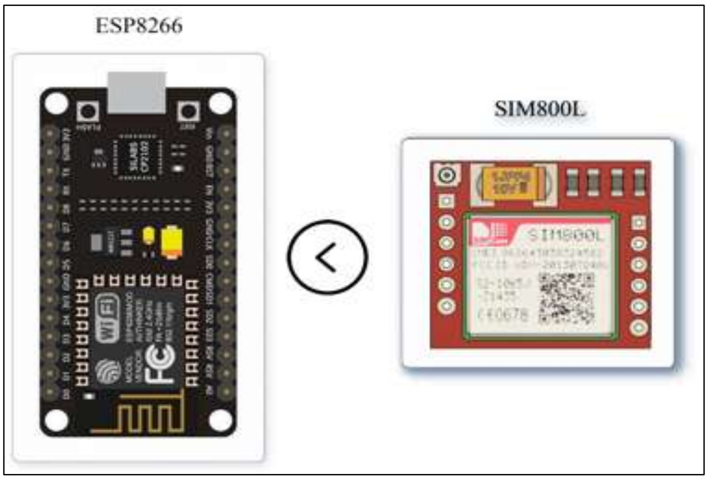

Figure 2: Block diagram of the Project (Receiver).
Source: Authors, (2025).

In Figure 1, system transmitter block diagram is presented. The transmitter unit uses several sensors to monitor industrial parameters, including gas, flame, temperature, motion, and optical sensors. The Arduino Nano serves as the system's microcontroller, while the ESP Wi-Fi module transmits data to the receiving unit using the HTTP protocol. A relay switches loads on or off, and the water pump is controlled accordingly. The LCD displays real-time data. It features an exhaust fan for cooling, a water pump for fire response, and a touch sensor for manual operation if automation fails. In Figure 2, illustrates a block diagram of the system receiver. The receiver unit uses two components: a NodeMCU and a GSM module. The microcontroller gathers data, saves it on the server, and sends messages to the appropriate authority.

II.2 SYSTEM CIRCUIT DIAGRAM

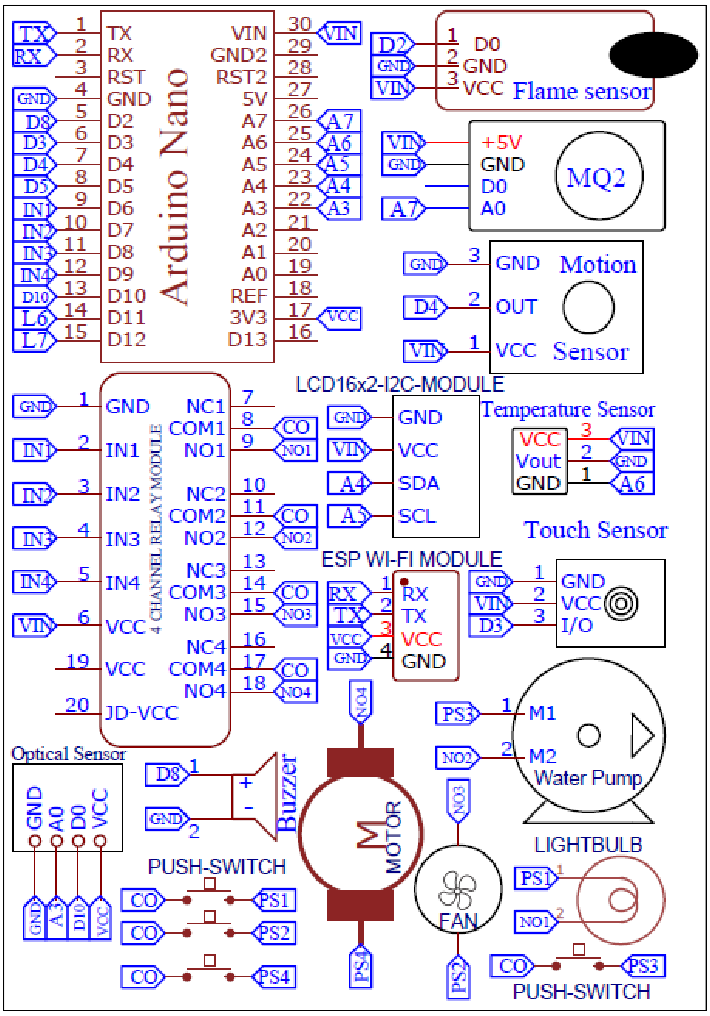

Figure 3: Circuit diagram of the system (Transmitter).

Source: Authors, (2025).

In Figure 3, the transmitter section shows the operation of the Arduino Nano, with the Flame, Motion, Buzzer and Touch sensors connected to digital pins D2, D3, D4, and D8 respectively. The MQ-2 gas sensor, temperature sensor, LCD module, and ESP Wi-Fi module are connected to analog pins A4, A5, A6, A7, and the TX/RX pins, respectively. The optical sensor is connected to digital pin D10 and analog pin A3 of the Arduino. The motor, fan, water pump, and light are controlled via a push switch using a 4-channel relay module, with connections to Arduino Nano pins D6, D7, D8, and D9, respectively. In Figure 4, in the receiver section TX and RX pins of the GSM SIM800L are connected to the D0 and D1 pins of the ESP8266 Wi-Fi module, respectively.

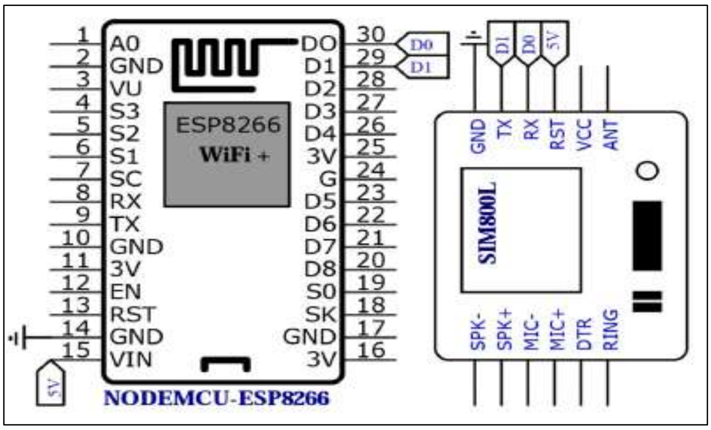

Figure 4: Circuit diagram of the system (Receiver).
Source: Authors, (2025).

II.3 DATA TRANSMISSION AND WEBSITE STROAGE

In Figure 5, the HTTP protocol is employed to securely transmit sensor data from the operation to the server. Data is securely stored in a MySQL database using Next.js and a Node.js server, that ensures the dependability of the Industrial centralized Control system. Through the ESP8266 Wi-Fi module, the sensor data is sent to the Node.js server. This secure repository provides access to the Industrial centralized control data through an easy-to-use Next.js online interface. Scalability is assured by MySQL, which efficiently manages massive data volumes.

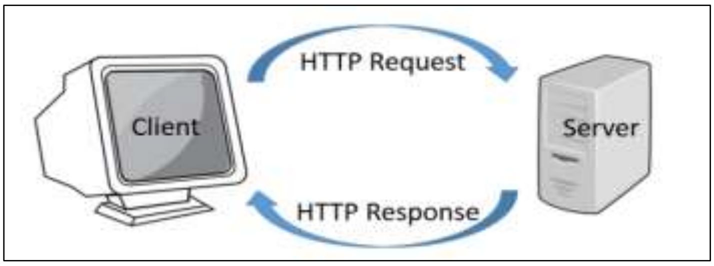

Figure 5: HTTP Communication Protocol work flow.
Source: Authors, (2025).

II.4 FLOWCHART

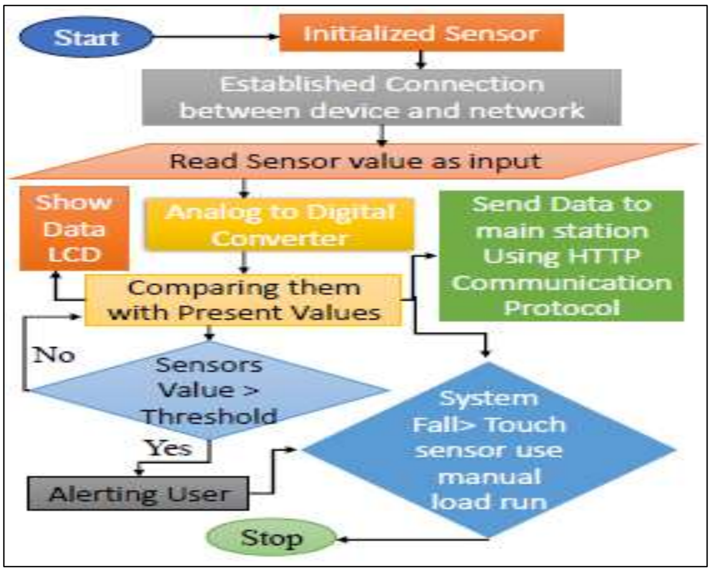

Figure 6: Flowchart of the Project (Transmitter).
Source: Authors, (2025).

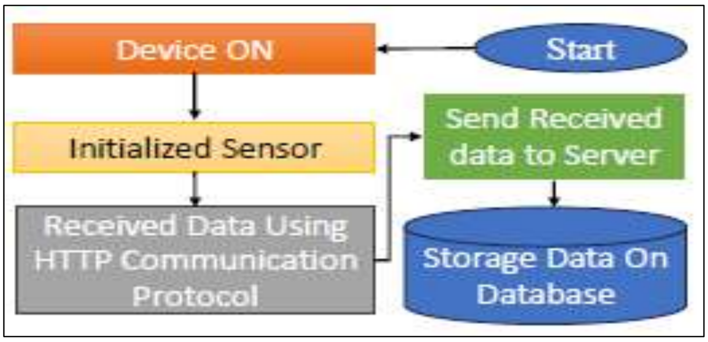

Figure 7: Flowchart of the Project (Receiver).
Source: Authors, (2025).

In Figure 6, the transmitter flowchart is demonstrated. Sensor data are compared with the threshold value, and when it exceeds, an onsite fire alert is triggered to notify the authority. If the system does not operate automatically, the touch sensor allows for manual restart. The data is gradually displayed on the LCD monitor. The receiver flowchart depicted in Figure 7, processes this data, combining it with information from the GSM module. The system sends an SMS message, and the server stores the information. The user can easily monitor and visualize the data through the website and mobile app.

II.5 PROTOTYPE

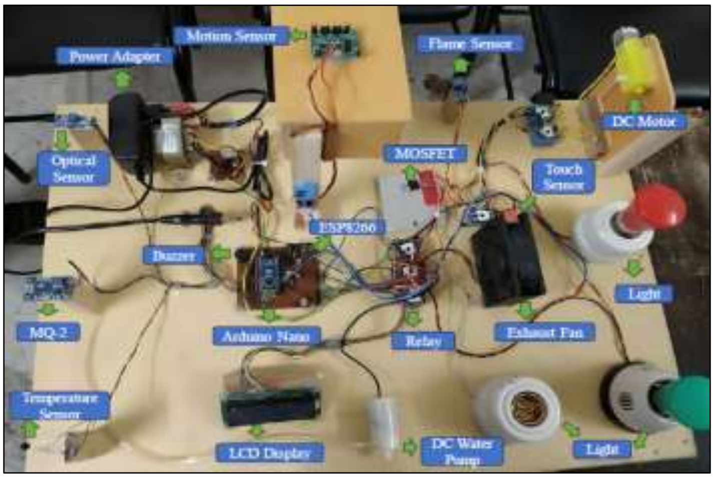

Figure 8: System Overview (Transmitter).
Source: Authors, (2025).

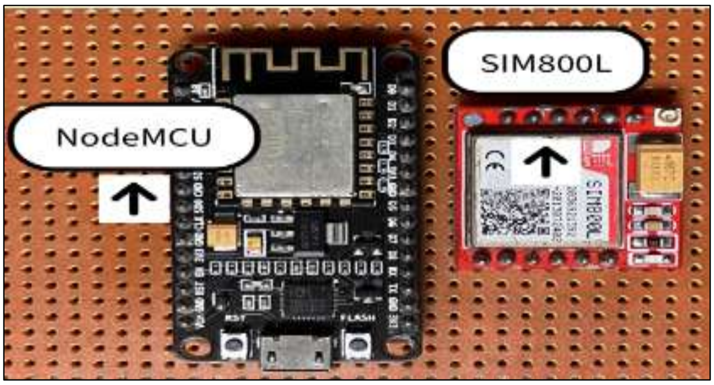

Figure 9: System Overview (Receiver).
Source: Authors, (2025).

In Figure 8, illustrates the implementation of the system's transmitter prototype. The prototype of the Industrial Centralized Control Automation System, featuring components such as an Arduino Nano, ESP8266, SIM800L, MQ-2, relay, optical sensor, motion sensor, flame sensor, an exhaust fan, bulb, buzzer, a water pump, and an LCD module. The system responds automatically to threshold breaches, displaying data on the LCD and triggering a buzzer for alerts. It includes mechanisms for cooling, fire response, and load control, with a touch sensor for manual operation if automatic functions fail. Data is transferred to the cloud via the HTTP protocol. In

Figure 9, demonstrates the system overview of the receiver part. The SIM800L ensures data availability in the station section during power crises or major issues and provides alerts via SMS notifications. Additionally, the microcontroller transmits operational signals and sends alerts via email notifications. Authorities can easily monitor data through a website and mobile app, with the system generating graphs for further analysis.

III. RESULTS AND ANALYSIS

In Figure 10, where the y-axis displays flame levels with a threshold value of 0 or 1, the x-axis displays continuous dates. The threshold value for this performance is set to 1. In Figure 11, shows the Gas Concentration Over Time of the system. The MQ2 Gas Sensor data from November 1, 2023, which shows dynamic variations in gas concentration, are shown in Fig.10. At 8:00 a.m, a moderate 20 ppm was recorded, rising to 25 ppm at 9:00 a.m, indicating increased gas presence.

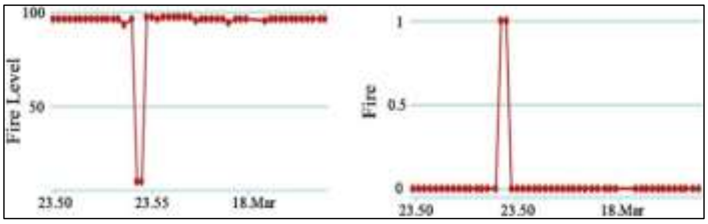

Figure 10: Performance of flame sensor data.
Source: Authors, (2025).

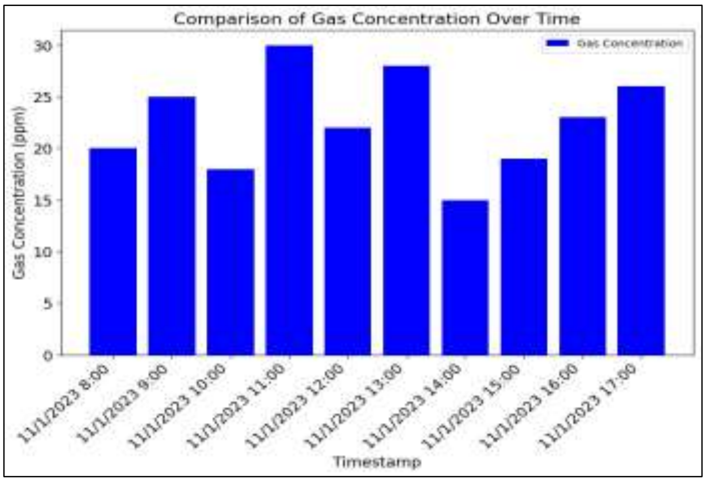

Figure 11: Gas Concentration Over Time of the system.
Source: Authors, (2025).

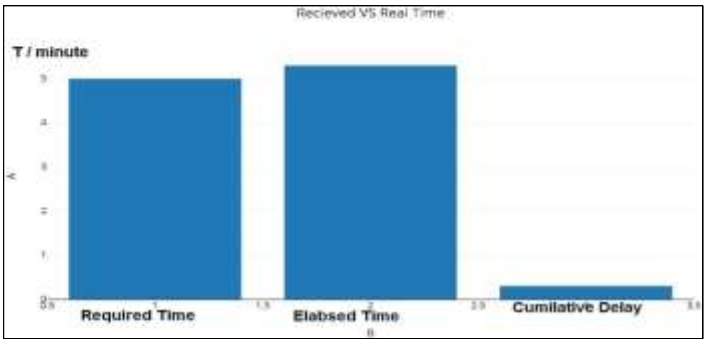

Figure 12: Analysis of the System operation.
Source: Authors, (2025).

In Figure 12, shows the system's operation time versus elapsed time, indicating the actual time is slightly below the required time, with minimal cumulative delay, reflecting fast response.

Figure 13: Website Visualization.
Source: Authors, (2025).

Figure 14: Mobile Visualization.
Source: Authors, (2025).

In Figure 13, and Figure 14, showcase data visualization on the website and mobile app. The system uses Next.js and a Node.js server to securely store sensor data in a MySQL database, ensuring reliability. The ESP8266 transmits data via HTTP, while the scalable MySQL database supports real-time industry monitoring through a user-friendly interface. In Figure 15, shows the LCD displaying output values, allowing the authority or user to easily monitor internal data. In Figure 16, and Figure 17, demonstrate the visualization of email and SMS notifications. When a fire occurs or any value exceeds the threshold, the user receives a notification.

Figure 15: Mobile Visualization.

Source: Authors, (2025).

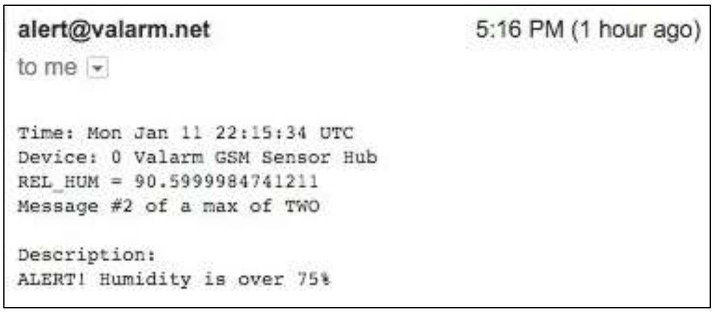

Figure 16: Email notification.
Source: Authors, (2025).

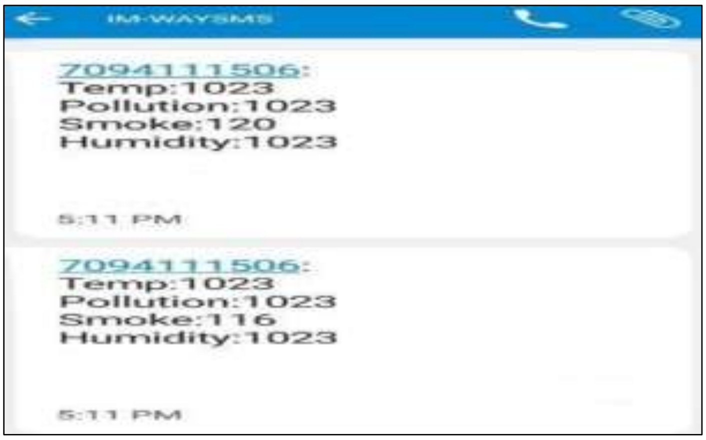

Figure 17: Email notification.
Source: Authors, (2025).

In Table 1, the fire smoke levels range from low to high, triggering a fire alarm and activating the exhaust fan accordingly. In Table 2, it categorizes temperature sensor levels (low to high) and generates an over-temperature alarm if thresholds are exceeded. In Table 3, the flame sensor result (detect/no detect) triggers a fire alarm, activates the pump motor, and initiates water spray when a flame is detected.

Table 1: Result for Smoke Sensor.

SL	Smoke Level	Smoke Alarm	Exhaust Fan
1	Low (0-50) PPM	Off	Off
2	Medium (51-100)PPM	Off	Off
3	High (101PPM<above)	On	On

Source: Authors, (2025).

Table 2: Temperature Sensor Result.

SL	Temperature Value	Over Temp. Alarm	Light(Heater)
1	Low (0°- 22°)	Off	On
2	Medium(23° - 45°)	Off	On
3	High(45°<Above)	On	Off

Source: Authors, (2025).

Table 3: Flame Sensor Result.

SL	Fire Value	Fire Alarm	Pump Motor
1	No Detect	Off	Off
2	Detect	On	On

Source: Authors, (2025).

Table 4: Comparison with Other’s Research.

Paper ID	Data in LCD	SMS Alert	Buzzer Alert	Email Notify	Mobile App	Web site	Fire Detect	Temp. Monitor	Water Spray Fire Fightig	Gas Detect	Exhaust Fan (Cooling)	Optical & Motion detect	Industry Load Control	Manual start (Touch sensor)
Ref[4]	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No
Ref[5]	No	No	No	No	No	No	Yes	No	Yes	Yes	No	No	No	No
Ref[6]	Yes	No	Yes	No	No	Yes	Yes	No	No	No	No	No	No	No
Ref[7]	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No

Ref[8]	No	Yes	Yes	No	Yes	No	Yes	Yes	No	No	No	No	No	No
Ref[9]	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No
Ref[10]	No	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No
Ref[11]	No	No	Yes	No	No	Yes	Yes	Yes	No	No	No	No	No	No
Ref[12]	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	No	No	No
Ref[13]	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No
Ref[14]	No	No	Yes	No	No	No	Yes	No	No	Yes	No	No	No	No
Ref[15]	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	No	No	No
Ref[16]	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Ref[17]	No	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No
Ref[18]	No	No	Yes	No	No	No	Yes	No	No	Yes	No	No	No	No
Ref[19]	No	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	No	No
Propose	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Authors, (2025).

Table 5: Calculating the proposed system's price.

SL	Component Name	Quantity	Price (BDT)
1	Arduino Nano	1	400TK
2	ESP8266	1	320TK
3	MQ-02	1	150TK
4	Relay	7	350TK
5	Buzzer	1	20TK
6	Touch sensor	1	80TK
7	Temperature Sensor	1	10TK
8	LCD Display	1	340TK
9	Motion Sensor	1	110TK
10	Wifi Sensor	1	420TK
11	Flame Sensor	1	69TK
12	DC Water Pump	1	160TK
13	DC Motor	1	70TK
14	DC Exhaust Fan	1	75TK
15	Optical Sensor	1	150TK
16	Power Supply	1	250TK
17	Miscellaneous Cost	-	350TK
-	Total Cost	-	3574TK(29.24USD)

Source: Authors, (2025).

In Table 4, presents a comparative analysis with existing research, demonstrating that the proposed system outperforms others in visualization for alert detection and automated control of critical parameters over manual methods. In Table 5, presents a cost breakdown of the proposed system, including components, quantities, and pricing (in TK). The total cost of the system is 3574 TK (29.24 USD), making it an economical solution for monitoring industrial safety. Future work will focus on real-world deployment to evaluate long-term performance, including continuous data collection, fault analysis, and adaptation to dynamic operational conditions for enhanced reliability.

IV. CONCLUSIONS

Our research presents a designed industrial automated system that ensures timely alerts and securely stores data on a server. Authorities can access this information securely, while an LCD displays real-time data. The system provides alerts through email and SMS notifications. Future updates will incorporate machine learning. In general, the system helps users to easily monitor the data.

V. AUTHOR'S CONTRIBUTION

Conceptualization: Md. Mehedi Hassain.
Methodology: Md. Mehedi Hassain, Gonga Sutradhar and Md. Nayeem Ibna Harun.
Investigation: Md. Mehedi Hassain and Abdur Rahman.
Discussion of results: Md. Mehedi Hassain, Gonga Sutradhar and Md. Ariful Islam.
Writing – Original Draft: Md. Mehedi Hassain.
Writing – Review and Editing: Md. Mehedi Hassain and Md. Nayeem Ibna Harun.
Resources: Md. Mehedi Hassain.
Approval of the final text: Md Mehedi Hassain, Gonga Sutradhar, Md. Nayeem Ibna Harun, Abdur Rahman and Md. Ariful Islam.
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VI. REFERENCES

[1] Islam, S.; Mia, M.A.H.; Abedin, M.Z. Evaluation of Causes and Effects of Fire and Other Safety Incidents in Readymade Garment 197 Industry of Bangladesh. American Journal of Mechanical and Industrial Engineering 2022, 7, 13–30.

[2] Tahmid, M.; Jahan, N.; Tasnim, N.; Syeda, S.R. Major Accident Control in Temporary Storage Facilities: An Investigative 199 Consequence Analysis of the Bangladesh Container Depot Accident 2022. ACS Chemical Health & Safety 2022, 29, 494–505.

[3] Tarek Haider, M. Study of safety and security issues in the working environment of small scale industries of old Dhaka 2007.

[4] Sekar, R.A.; Prabakaran, T.; Sudhakar, A.; Kumar, R.S. Industrial automation using IoT. In Proceedings of the AIP Conference Proceedings. AIP Publishing, 2022, Vol. 2393.

[5] Abinand, A.; Sairabanu, S. Smart industrial fault monitoring and alert system. In Proceedings of the AIP Conference Proceedings. AIP Publishing, 2023, Vol. 2861.

[6] Islam, M.N.; Rahman, M.A.; Ashrafi, K.M.A.; Ahmed, T. Development of an IoT based industrial fault detection and diagnosis system. Asian Journal For Convergence In Technology (AJCT) ISSN-2350-1146 2023, 9, 18–22.

[7] Bharti, T.; Saini, M.L.; Kumar, A.; Tiwari, R. Design and implementation of industrial fire detection and control system using internet of things. In Artificial Intelligence, Blockchain, Computing and Security Volume 1; CRC Press, 2024; pp. 310–315.

[8] Saini, M.L.; Kumar, R.; Sati, D.C.; Bharti, T. Fire Monitoring and Prevention System Based on the Severity of Fire Using NodeMCU and Cloud. In Proceedings of the 2024 International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE). IEEE, 2024, pp. 1–6.

[9] Jadhav, R.J.; Radhakrishnan, P.; Jadhav, D.A.; Ashreetha, B.; Divya, J.; Mukherjee, S. Internet of Things Enabled Gas Leakage Detection Over Industrial Areas using Powerful MQ Series Sensor and Controller. In Proceedings of the 2024 International Conference on Inventive Computation Technologies (ICICT). IEEE, 2024, pp. 1679–1686.

[10] Devi, V.S.; Vishwa, K.; Vaseegaran, K.; et al. Fire Detection and Prediction using Machine Learning for Fireworks Industry. In Proceedings of the 2024 International Conference on Inventive Computation Technologies (ICICT). IEEE, 2024, pp. 884–889.

[11] Ibrahim, S.; Shukla, V.K.; Gupta, S.; Sharma, P. Addressing Smart Fire Detection Management through the Internet of Things and Arduino. In Computational Intelligence in Urban Infrastructure; CRC Press, 2024; pp. 171–179.

[12] Jumde, N.T.; Kolhe, H.J.; Talawdekar, V.L.; Pal, R.B.S. Industrial Parameter Monitoring with SMS Alert. International Journal of Modern Developments in Engineering and Science 2024, 3, 13–17.

[13] Priya, L.; Vedhapriyavadhana, R.; Ignisha Rajathi, G.; Allwyn Kingsley, G.; Johny Elton, R. An IOT integrated fire monitoring and detection system using Raspberry Pi. Turkish Journal of Physiotherapy and Rehabilitation 2021, 32.

[14] Manikandan, G.; Karunkuzhali, D.; Geetha, D.; Kavitha, V. Design of an IoT approach for security surveillance system for industrial process monitoring using Raspberry-Pi. In Proceedings of the AIP Conference Proceedings. AIP Publishing, 2022, Vol. 2519.

[15] Masum, A.K.M.; Shan-A-Alahi, A.; Al Noman, A.; Uddin, M.N.; Azam, K.I.; Rakib, M.G.S. IoT-Based Smart Monitoring System to Ensure Worksite Safety—A Context of Garment Industry in Bangladesh. In Proceedings of the Inventive Communication and Computational Technologies: Proceedings of ICICCT 2019. Springer, 2020, pp. 1285–1293.

[16] Majmudar, M.; Jethwa, J.; Patil, A.; Harpale, J.; Bhaskar, S. IoT Technologies Based Fire and Safety Alerting System Using Android Application. In Proceedings of the Proceedings of the Second International Conference on Information Management and Machine Intelligence: ICIMMI 2020. Springer, 2021, pp. 483–490.

[17] Praveena, N.; Deepa, G.; Manju, M. Design of an IOT Approach for Industrial Security Surveillance System. International Journal of Scientific & Technology Research 2020, 9, 6444–6448.

[18] Habib, A.; Sharma, S.; Rahman, M.R.; Haque, M.N.; Bhuyan, M.A.I. Fire Safety and Supervision System: Fire Hazard Monitoring Based on IoT. In Proceedings of the Proceedings of the International Conference on Big Data, IoT, and Machine Learning: BIM 2021. Springer, 2022, pp. 367–377.

[19] Kabir, S.; Riyad, M.E.H.; Tanisha, U.T.; Bhuiyan, M.H.R.; Toha, T.R.; Alam, S.M.M. Automatic Fire Monitoring System in Textile Industry. In Proceedings of the 2020 11th International Conference on Electrical and Computer Engineering (ICECE). IEEE, 2020, pp. 471–474.