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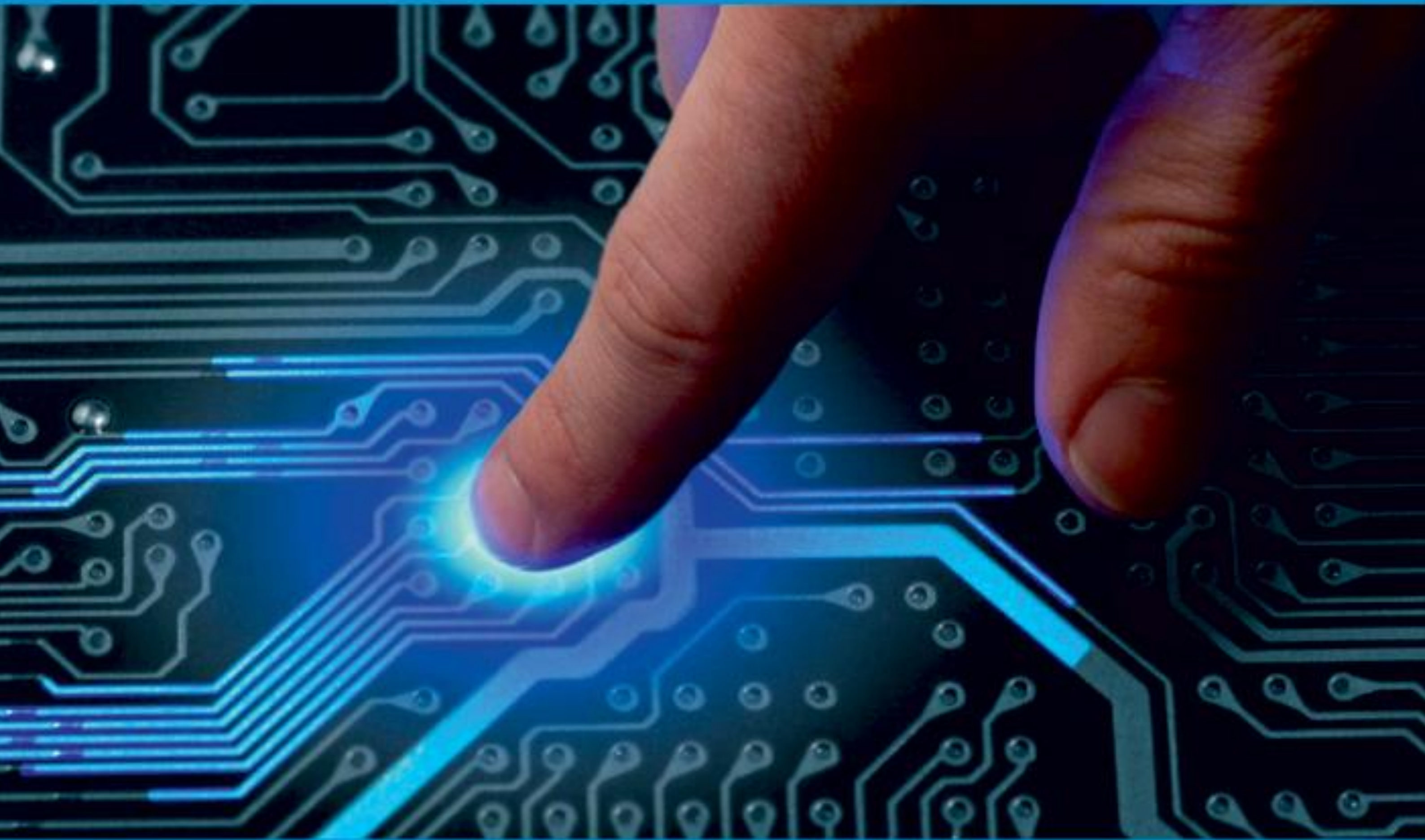

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Salvation Framework for Industrial security using Node MCU ESP8266

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ABSTRACT: "Salvation" refers to the act of saving or protecting from failure, loss, destruction, deliverance from danger or difficulty. "Framework" refers to A particular set of rules or ideas which one uses in order to deal with problems. In Computer-systems, a framework is often a layered structure indicating what kind of programs should be built and how they interrelate. Thus, "Salvation Framework" is a project based on measures taken to withstand the problems occurring in a system/environment in different day-to-day occurring problems with respect to insecurities or destruction of products, non-living valuable things and human life.

KEYWORDS: Salvation; Framework;

I. INTRODUCTION

In today's industrial landscape, ensuring a safe working environment is of utmost importance. With the potential risks of fires, intruders, and workplace accidents, factories need to implement robust security measures to safeguard their employees, assets, and operations. This project aims to develop a comprehensive factory security system that integrates advanced technologies, such as flame, temperature, motion, and smoke sensors, to enhance security, prevent fires, and ensure employee safety.The objective of this project is to leverage these sensors to create a seamlessly interconnected security system within the factory environment. By deploying multiple sensors, the proposed security system will enable factories to detect and respond to potential security threats in real-time. The flame sensors will detect any signs of fire outbreaks and immediately alert relevant stakeholders, while the temperature sensors will monitor for abnormal temperature spikes that may indicate equipment malfunctions or other safety risks. The motion sensors will detect any unwanted movement or presence of intruders, and the smoke sensors will detect and alert employees in case of a smoke outbreak.Key components of this factory security project include the integration of these sensors into a centralized control system to manage and optimize security operations, the installation of fire safety systems, such as sprinklers and alarms, to prevent and mitigate fire outbreaks, and the deployment of security personnel to respond to security threats and ensure employee safety.The benefits of this security project are significant. It will lead to increased security by enabling quick response to security threats, reducing the risk of fires and other safety risks, and creating a safe working environment for employees. Additionally, the project will improve operational efficiency by reducing downtime due to security-related incidents and enhancing asset protection by preventing loss of equipment and inventory. this factory security project aims to enhance security, prevent fires, and ensure employee safety. By leveraging advanced security technologies and implementing a comprehensive security system, factories can create a secure and safe working environment, boost productivity, and achieve long-term success in the highly competitive industrial landscape.

II. RELATED WORK

In [1] authors explain the importance of IoT and the role of Nodemcu in facilitating the development of IoT applications. They describe the hardware and software components of Nodemcu, including the microcontroller, Wi-Fi module, and programming interface. The paper presents examples of IoT applications that use Nodemcu, such as home automation and environmental monitoring. The authors also discuss the advantages and limitations of using Nodemcu in IoT products. Overall, the paper provides a comprehensive guide for developers interested in using Nodemcu for their IoT projects. Authors [2] suggested that a firefighting robot system that utilizes flame sensors for fire detection

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and multi-robot coordination for fire extinguishing. The authors employ a simulation-based approach to test the system's performance. The paper presents a detailed description of the system's hardware and software components. The authors demonstrate the effectiveness of the system in extinguishing fires in simulated environments. Overall, the paper contributes to the development of effective firefighting robot systems. Authors [3] Suggested that a smoke detection and alarm system based on LoRa (Long Range) technology. The authors explain the design of the system, which consists of a smoke sensor, LoRa module, and microcontroller. The system can transmit alarm signals over long distances, making it suitable for use in large buildings. The authors also describe the software used to program and control the system. The paper presents experimental results demonstrating the effectiveness of the smoke detection and alarm system. Overall, the paper provides a valuable contribution to the development of reliable and efficient smoke detection and alarm systems. Authors [4] Suggested thatan overview of temperature sensors used for measuring the temperature of photovoltaic (PV) modules. The authors describe the importance of accurate temperature measurement for assessing the performance and reliability of PV modules. They present various types of temperature sensors, including thermocouples, resistance temperature detectors (RTDs), and thermistors. The authors also discuss the advantages and limitations of each type of sensor. The paper includes a comparison of the accuracy and cost of the different sensors. Overall, the paper provides a comprehensive guide for selecting temperature sensors for PV module temperature measurement.The paper presents the development of a security system that uses motion sensors powered by RF (Radio Frequency) energy harvesting. The authors explain the design of the system, which consists of a motion sensor, RF energy harvesting circuit, and microcontroller. The system can detect and respond to intruders without the need for batteries or external power sources. The authors describe the software used to control the system and send alarm signals to a central monitoring station. The paper presents experimental results demonstrating the effectiveness of the security system in detecting intruders. Overall, the paper provides a valuable contribution to the development of self-powered security systems.

III. PROPOSED ALGORITHM

Salvation framework architecture diagram:

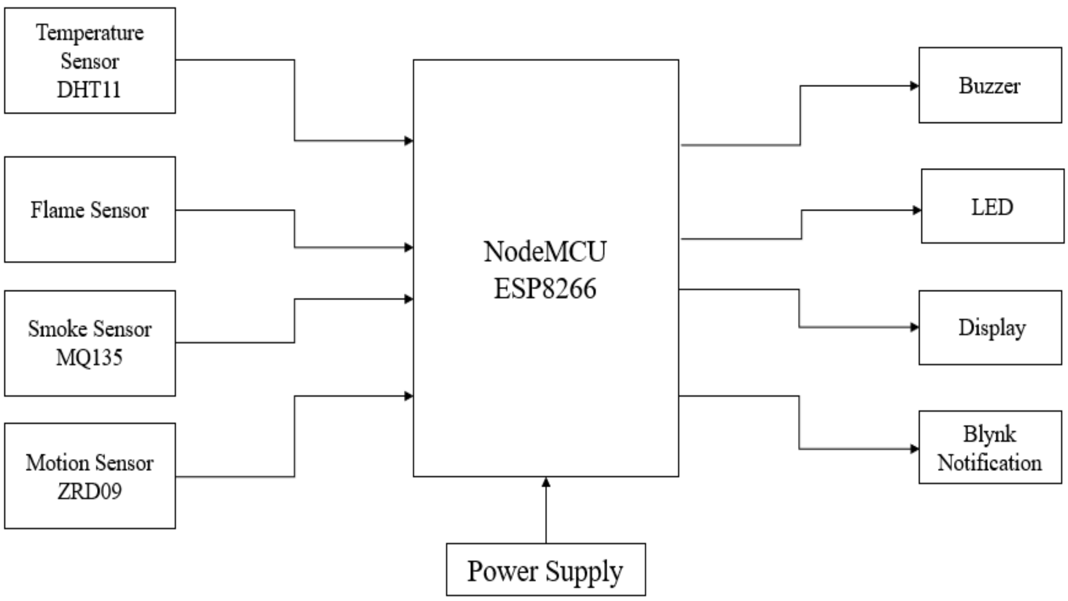

Fig 1 Architecture diagram

In above Fig 1shows thatMicro-controller unit is used to handle or manage the working of all the parts of the working unit i.e., system. Temperature sensor is used to sense the rise in temperature in the specified location of the factory unit.Motion sensor is to sense the motion of living things in a particular area.A smoke sensor is a type of sensor that detects the presence of smoke or other airborne particles.A flame detector is a sensor designed used to detect and respond to the presence of flame or fire.This unit is to supply an appropriate amount of electricity or power required for the different parts of the system to work properly.Display is used to show the A buzzer is used as an output device which will beep to alert about the danger. A led is used to notify about the validated fingerprint.

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Procurement of Security Equipment:Identify and procure the necessary security equipment based on the project requirements, such as flame sensors, temperature sensors, motion sensors, smoke sensors, surveillance cameras, access control devices, and alarm systems. The selected equipment is compatible with the security system architecture and meets the required specifications and standards.
System Integration and Connectivity:Install and configure the security hardware components, including sensors, cameras, access control devices, and alarm systems, according to the system design and layout. Proper connectivity and integration between the hardware elements, allowing them to communicate and share data seamlessly.
Software Installation and Configuration:Deploy the security management software that will serve as the central control system for the factory security.Configure the software according to the security objectives and requirements, including user access control, security policies, and event handling procedures.Integrate the software with the installed security hardware components to enable centralized monitoring and control.
Sensor Calibration and Testing:Calibrate the sensors, such as flame sensors, temperature sensors, motion sensors, and smoke sensors, to ensure accurate and reliable detection.Conduct comprehensive testing of each sensor to verify its functionality and responsiveness.Fine-tune the sensor settings as necessary to optimize their performance and minimize false alarms or missed detections.
Alarm and Alert System Configuration:Configure the alarm and alert systems based on the security objectives and incident response procedures.Set up notification protocols to ensure appropriate personnel, management, or emergency services are promptly alerted in case of security breaches or incidents.Test the alarm systems to ensure they trigger alerts effectively and integrate them with the security management software.
User Training and Awareness:Provide training sessions for employees to familiarize them with the security system, including access control procedures, alarm response protocols, and emergency evacuation plans.Raise awareness about the importance of adhering to security measures and reporting any security concerns or incidents promptly.
Ongoing Maintenance and Monitoring:Regularly maintain and update the security system hardware and software components to ensure optimal performance.Conduct periodic audits and testing to identify and address any vulnerabilities or system weaknesses.Monitor security incidents and analyze trends to proactively identify areas for improvement and adjust security measures accordingly.

Intrusion Detection Algorithms:
a. Motion Detection Algorithms: These algorithms analyze sensor or video data to detect motion within the factory premises. They can employ techniques such as background subtraction, optical flow analysis, or deep learning-based approaches to identify and track moving objects, thereby detecting potential intruders or unauthorized activities.
b. Pattern Recognition Algorithms: Pattern recognition algorithms analyze sensor or video data to detect suspicious patterns or anomalies in behaviour. They can use techniques like anomaly detection, clustering, or machine learning-based approaches to identify deviations from normal behavior and trigger alerts for potential security breaches.

Fire Detection Algorithms:
a. Flame Detection Algorithms: Flame detection algorithms analyze video or image data to identify the presence of flames or fire. They can employ techniques such as color-based flame detection, shape analysis, or machine learning-based approaches to differentiate flames from other light sources and raise alarms or initiate appropriate fire mitigation actions.
b. Smoke Detection Algorithms: Smoke detection algorithms analyze sensor data or video feeds to detect the presence of smoke particles. They can utilize techniques like image processing, edge detection, or machine learning-based approaches to identify smoke patterns and trigger alerts for early fire detection.

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IV. SIMULATION RESULTS

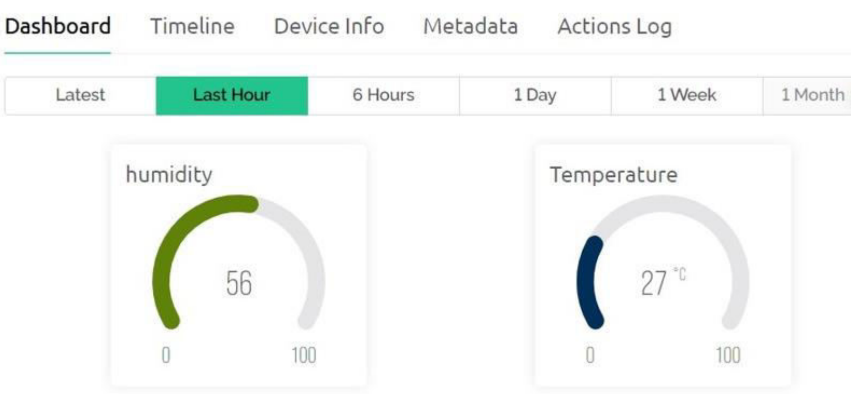

Fig 2 Real time detection of temperature and humidity

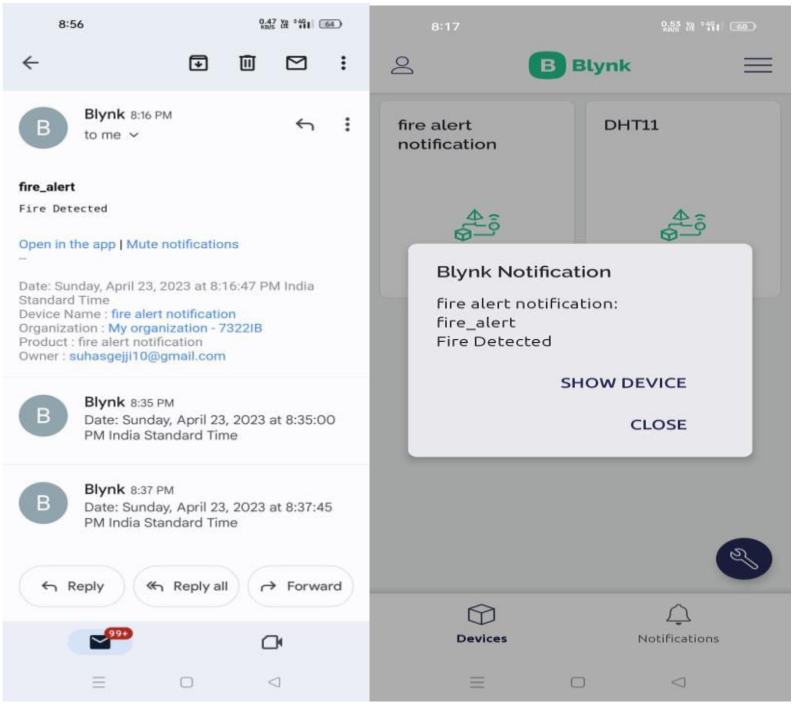

Fig 3 Email and application notification of fire

Fig 4 Real time monitoring of air quality index

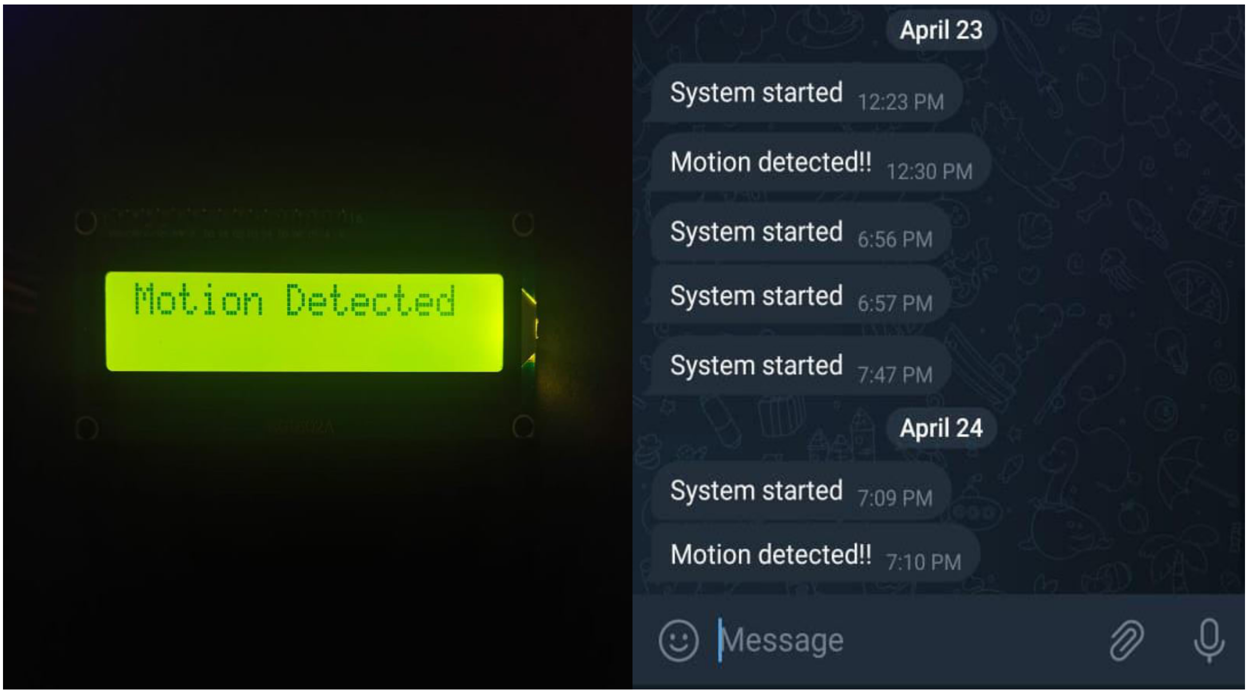

Fig 5 Message and display notification of motion

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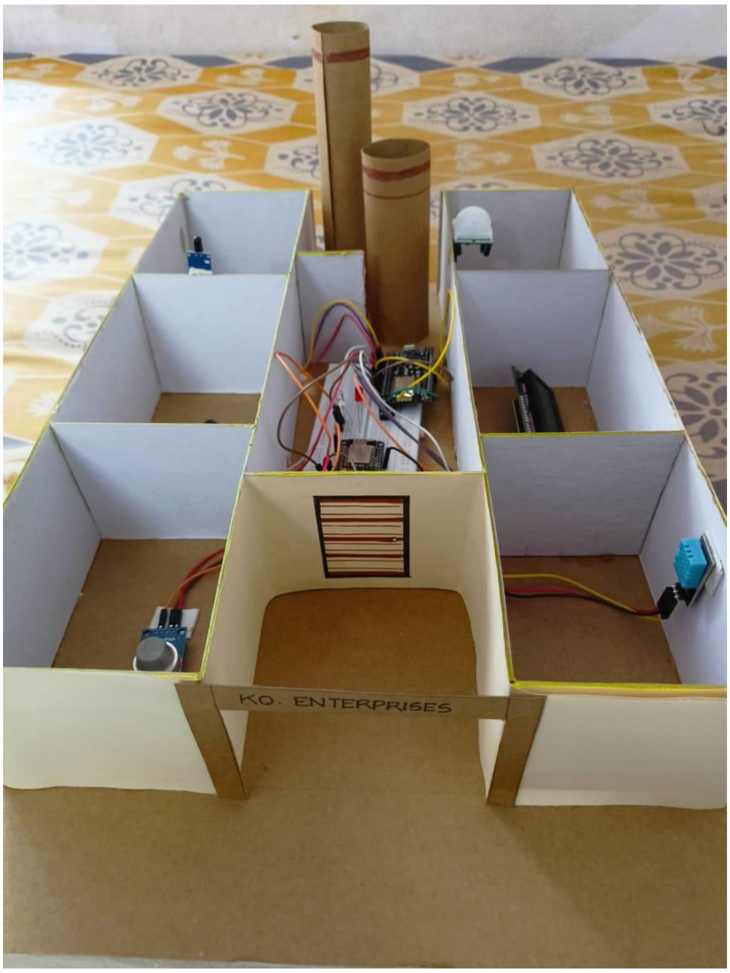

Fig 6 Salvation framework security model

V. CONCLUSION AND FUTURE WORK

The Salvation framework is an essential step towards ensuring the safety and security of industrial facilities. By integrating various sensors such as flame, temperature, motion, and smoke sensors, the project aims to prevent and detect potential hazards such as fires, gas leaks, and intruders in real-time. The project is designed to provide early warning alerts to the centralized security system, which allows the security personnel to take prompt action and prevent any damage. Additionally, the project can be integrated with other security measures such as CCTV cameras, alarms, and access control systems, providing comprehensive security to the facility. In today's world, where industrial facilities face various threats, it is crucial to implement such security projects to ensure the safety and security of personnel, equipment, and property. The Salvation framework can significantly reduce the risk of hazards and provide a safe and secure environment for all. Future work with AI integration in IoT based factory security systems can enhance the overall security by identifying potential threats, analysing data, and providing real-time alerts. This can help in preventing security breaches and ensuring a safer work environment.

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