

Centre of Development of Advanced Computing



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INTERNET OF THINGS

SUBMITTED TO

MR. SHUBHAM SHRIVASTAV

SUBMITTED BY

AYUSH PATWA (240340126003)

PRASAD KADAM (240340126006)

KAUSHAL KUMAR MAURYA (240340126007)

PRAFULKUMAR BHOI (240340126010)

INTRODUCTION TO SMART CONTAINERIZED TEMPERATURE AND HUMIDITY MONITORING SYSTEM

Enhanced monitoring system for maintaining optimal conditions in shipping containers with real-time alerts



AGENDA

Explore the Comprehensive Aspects of Smart Containerized Temperature and Humidity Monitoring System

1 Project Overview

2 Technology Stack

3 System Architecture

4 Key Features

5 AWS Integration

6 Data Management

A large container ship is docked at a port. A yellow crane is lifting a blue container from the ship. The ship's hull is white with blue and red accents. The sky is blue with some clouds. The water is calm.

1

ADVANCED MONITORING SOLUTION

Utilizes a Raspberry Pi as a gateway and a DHT sensor for real-time data acquisition.

A large industrial facility, possibly a refinery or chemical plant, with multiple levels of metal structures, pipes, and walkways. The sky is overcast.

2

ROBUST DATA MANAGEMENT

Stores data locally in a MySQL database for immediate and historical access through a web interface developed with HTML, CSS, and JavaScript.

TECHNOLOGY STACK

Key Technologies for Monitoring System Efficiency



Raspberry Pi

Acts as the data transmission gateway for seamless connectivity.



Python Flask

Enables efficient backend processing for application logic.



Web Interface

Developed with HTML, CSS, and JavaScript for user interaction.



DHT Sensor

Facilitates real-time temperature and humidity data acquisition.



MySQL

Stores local data, ensuring immediate and historical access.



AWS Integration

Utilizes AWS SES for alerts and S3 for data backups.

SYSTEM ARCHITECTURE

Key Components of Smart Containerized Temperature and Humidity Monitoring System

Sensor Data Acquisition

Utilizes DHT sensor to capture real-time temperature and humidity data within shipping containers for monitoring environmental conditions.

Data Transmission

Raspberry Pi acts as the gateway to transmit collected sensor data efficiently to the central server for processing and storage.

Backend Processing

Python Flask framework processes the incoming sensor data, ensuring efficient data handling and analysis for further actions.

Data Storage

Data is stored securely in a MySQL database, enabling both immediate access and historical retrieval for comprehensive monitoring and analysis.

Web Interface

HTML, CSS, and JavaScript technologies are integrated to develop a user-friendly web interface for interactive data visualization and control.

Alerts and Backups

AWS SES sends alerts for temperature or humidity threshold breaches, while AWS S3 ensures hourly data backups for redundancy and remote access.



KEY FEATURES

Essential Features for Smart Containerized Monitoring System

Real-time Monitoring

Continuous data acquisition and processing provide immediate insights into temperature and humidity changes within shipping containers.

Robust Data Management

Secure and reliable data storage in a MySQL database ensures quick access to historical environmental data for analysis and decision-making.

Effective Alerting

Instant email alerts are triggered upon threshold breaches, ensuring timely responses to critical temperature or humidity variations.

Global Accessibility

Web interface accessibility from anywhere enables remote monitoring and management of container conditions across various locations.

Data Redundancy

Regular backups to AWS S3 guarantee data redundancy and integrity, providing backup storage for critical environmental data.

▲ ENHANCED MONITORING CAPABILITIES

AWS INTEGRATION

Enhancing Smart Containerized Monitoring System with AWS Services



AWS SES Email Alerts

Sends immediate email notifications when temperature or humidity levels surpass pre-defined thresholds, ensuring timely response to critical environmental changes.



AWS S3 Data Backups

Performs hourly backups of collected data, guaranteeing data redundancy and facilitating remote access for historical analysis and system integrity.



PythonAnywhere Web Hosting

Facilitates global access to real-time and historical data through a user-friendly web interface, ensuring seamless monitoring and data retrieval from diverse locations.



Enhanced Functionality Integration

Combining AWS SES email alerts, S3 data backups, and PythonAnywhere web hosting optimizes system performance, scalability, and reliability for comprehensive monitoring solutions.



DATA MANAGEMENT

Data storage in MySQL database with AWS S3 backups for enhanced security and availability. Real-time and historical data access via web interface.

Component	Description
Data Storage	MySQL database for immediate and historical access
Backups	Hourly backups to AWS S3 for data security and availability
Data Access	Real-time and historical data viewing through web interface

INDUSTRY TRENDS

Exploring the Intersection of IoT and AI in Corporate Tech Priorities

45%

The IoT market is expected to grow at a Compound Annual Growth Rate of 45% until 2030, reflecting sustained industry interest and investment.

Description of a primary heading

Top-Three Prio

IoT remains a key focus for businesses, ranking within the top three corporate technology priorities due to its transformative potential.

Description of a primary heading

Enhanced Mon

The integration of AI with IoT is on the rise, offering advanced capabilities for monitoring systems, leading to more efficient operations and decision-making.

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Real-time Data

The smart monitoring system ensures instant data collection, enabling proactive responses to environmental changes.

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AWS Integratio

Utilizing AWS services like SES for alerts and S3 for data backups enhances the system's capabilities, ensuring data security and timely notifications.

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Best Quote Words

BB

**IN THE WORLD OF
LOGISTICS, PRECISION IS
NOT JUST AN OPTION; IT'S
A NECESSITY.**

Author Name

Antoine-Henri Jomini

BENEFITS FOR LOGISTICS

Enhancing Logistics Operations with Advanced Monitoring Systems

Real-time Visibility

Track temperature and humidity levels instantaneously, ensuring goods remain in optimal conditions throughout the transportation process.

Reduced Spoilage Risk

Minimize the chances of product spoilage and loss by promptly identifying and addressing unfavorable environmental conditions.

Data-driven Decision-making

Utilize generated data to make informed operational choices, enhancing efficiency and resource utilization in logistics management.

Regulatory Compliance

Adhere to industry standards and regulations effortlessly, ensuring seamless operations and avoiding penalties or disruptions.

Enhanced Customer Satisfaction

Ensure reliable and timely deliveries, leading to increased customer satisfaction and loyalty due to consistently high-quality service.

IMPLEMENTATION CHALLENGES

Key challenges in implementing the Smart Containerized Temperature and Humidity Monitoring System



Initial setup costs

Establishing the infrastructure for the system including hardware, software, and network setup can require significant initial investment.



Ensuring data security and privacy

Implementing robust security measures to protect sensitive environmental data from unauthorized access or breaches is crucial.



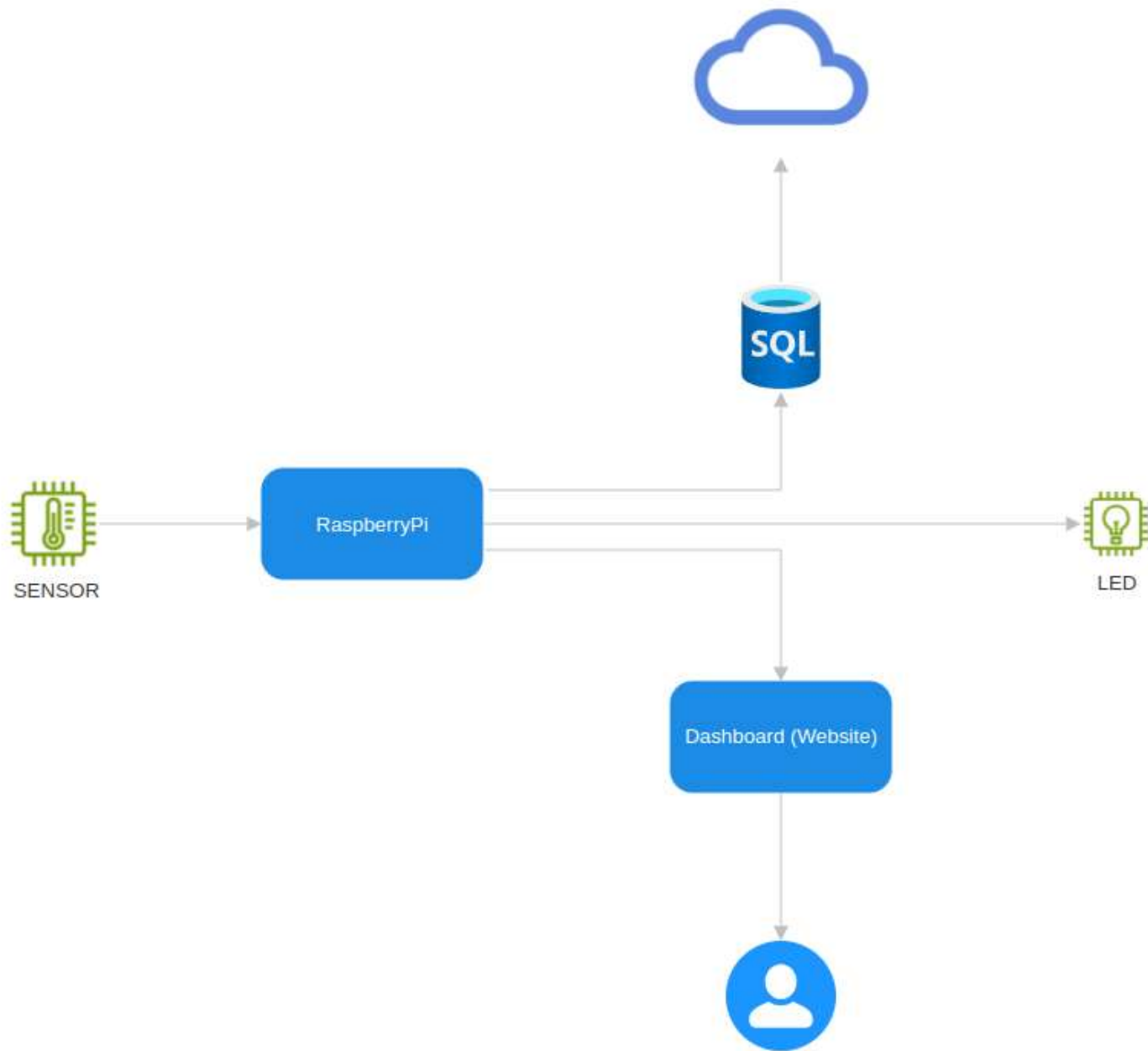
Integration with existing logistics systems

Seamlessly connecting the monitoring system with current logistics software and processes to ensure efficient data flow and decision-making.



Continuous monitoring and maintenance

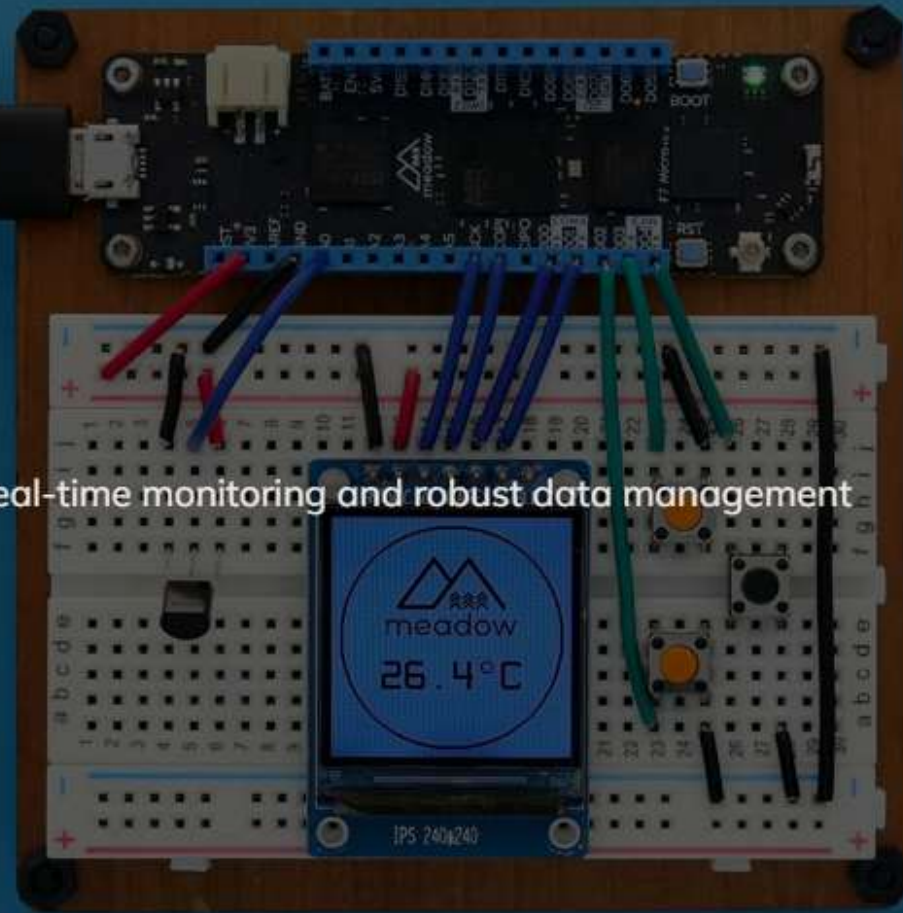
Regularly supervising system performance, addressing issues promptly, and conducting routine upkeep to guarantee reliable functionality.



▲ COMPREHENSIVE SOLUTION

CONCLUSION

Optimal conditions ensured through real-time monitoring and robust data management





Q&A

Engage now to unlock insights and
optimize your environment with our Smart
Containerized Monitoring System!