

# IOT Warehouse Monitoring Systems

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**Abstract:** It is intended to monitor the temperature and humidity inside the refrigerator and to manage the details of the internal refrigerator. In this system, there is the creation of an intelligent Internet-based monitoring system, the detection of temperature and humidity within the refrigerator unit and an intelligent inventory identification process using advanced technologies such as Cloud Computing, sensory and wireless communication technology. The system has great ability to monitor the refrigerator unit from anywhere and anytime using the mobile app. This app will be able to control and monitor with the mobile and web application. We will achieve a positive effect on data monitoring such as Temperature, Moisture, Satisfied with performance analysis system monitoring and system test results designed for refrigeration unit monitoring. In addition, the proposed system has significant benefits that reduce human effort of monitoring and losses due to uncontrolled environment.

**Keywords:** Refrigerator unit, Internet of Things, Intelligent Monitoring

## I. INTRODUCTION

With the progressive development of society, people are increasingly paying attention to food security in everyday life, especially the problem of food, milk and meat storage. In the cold food unit of the refrigerator units is an important part of ensuring food safety. In this section, the temperature and humidity inside the refrigerator and the condition of changing the door and location in the refrigerator must be considered in real time. The Internet of Things is a combination of the Internet and all kinds of data sensors such as radio frequency detection devices (RFID), infrared sensors, laser scanners, etc. Currently, based on simple RFID technology and integrated existing network technology, database technology and middleware technology to build a large network including a large number of network learning and many mobile labels. This technology is widely used in smart transport, environmental protection, public safety, peace family, smart fire, industrial surveillance, and many other areas, which have greatly improved the social and automation standard. Refrigeration technology can monitor temperature and humidity etc. Real-time and monitoring of the entire process intelligently to improve efficiency. The system is based on the concept of communication devices, and utilized advanced RFID technology, humidity technology, button monitoring device, wireless communication department and the Internet to create a remote refrigerator monitoring system. In this communication technology you can have real-time monitoring of temperature and humidity, gate switch status, inventory details all of which make the entire monitoring process accessible.

## II. EASE OF USE

### A. Need of Project

The main objective of the proposed system is to provide an IoT based food and grain warehouse monitoring system to reduce food losses and increase food safety.

### B. Objective

- To reduce food losses and increase food safety using Internet of things.
- To design and develop an android, and Web application for real-time monitoring Warehouse.
- To monitors the variation in the limit set for the sensors and send real-time updates to farmers.
- To develop a system which assure extra safety for food.

## III. LITERATURE REVIEW

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The agricultural chain is facing major new challenges these days. Among other things, monitoring and controlling heat through supply chains emerges as an important factor in addressing food waste, as well as increasing food safety and quality provided to consumers. While, the first stages of the preparation and distribution of temperatures have been established for food security, however, in the last three phases (in terms of transportation, retail, and housing), temperature control and maintenance have become more complex. In the retail sector in particular, the lack of information available on the implementation of cold refrigeration controls is highlighted. In addition, there are many studies that confirm that the temperature of display cabinets in refrigerator units is not always appropriate, according to safety standards. In Europe, there is a regulation made by the Council of Europe and Parliament that gives food companies the responsibility to comply with the requirements for temperature control and microbiological procedures applicable to food products, as well as the maintenance of cold chains.

With regard to this latter aspect, the regulation places the importance of regulating the temperature and proper operation of refrigeration equipment, considering that daily temperature readings are a valid way to control a series of cold in commercial outlets. However, there are studies proving that this approach does not guarantee compliance with food safety data, especially in southern Spain. Among the technologies that provide current temperature control solutions available throughout the cold chain, wireless sensor

monitoring technology, especially radio frequency (RF) and wireless nerve networks (WSN), have been identified as leaders in the sector, with many functions in their implementation to achieve global food temperature tracking, which is part of a broader food security program.

#### IV. PROPOSED WORK

In this system, the important factors such as temperature, humidity, door status is measured and detected. With the help of IoT the live data is visualized on the dashboard using MQTT broker and it can be monitored at any time by the farmers.

IoT nodes are designed using ESP32 microcontrollers & various sensors. These nodes are located in the warehouse at various locations. Farmers can observe the information using mobile phone as text message and e-mail and mobile application. In order to achieve well-organized warehouses in an easy way, let us present the idea of setting up a warehouse, which is based on IoT.

##### A. Block Diagram and Explanation

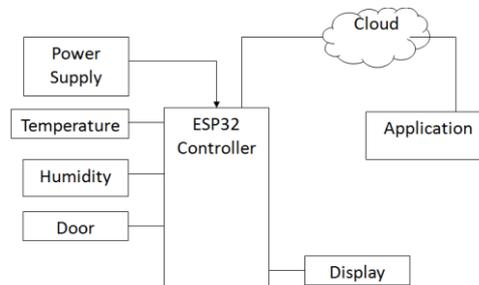


Figure 1.1: Block Diagram

The temperature sensor is used to sense the rise in temperature.

The humidity sensor is used to see the percentage of humidity present in the warehouse. On detection of harmful gas, the gas sensor helps in detecting CO inside the warehouse.

On detection of tilt or any lateral movement of the rack, the shock sensor is used.

If the presence of fire flame detected, to protect grains from fire, fire sensor is being used and a notification is sent to the user.

The sensors data is being displayed in the dashboard to which a user can monitor the live data results from anywhere and anytime.

Dashboard parameters update automatically with the newest sensor data. Moreover, simultaneously the e-mail is sent to the user.

##### B. Hardware required

- ESP32 Microcontroller

The ESP32 is a device that is connected to a 2.4 Ghz Wi-Fi and Bluetooth chips have been developed using the TSMC ultra low power 40 nm technology.

It is designed to achieve the best energy and radio-frequency features, demonstrating the reliability, convenience, and reliability, for a wide range of applications and power scenarios, ESP32 is designed for mobile, wearable electronics, and Internet of Things (IoT).

- Temperature Sensor (DHT22)

It is a high-precision temperature and humidity sensor. The sensor measures the relative humidity value.

The use of a capacitive sensor element to measure the relative humidity. An NTC thermistor used to measure temperature.

- HC-SR04

This is an ultrasonic distance sensor is used to determine the distance to an object by the help of radar. The use of a non-contact ultrasonic sonar to determine the distance to an object, and the two of ultrasonic transmitter, a receiver and a control circuit.

- MQ135

It is a gas sensor for the detection of a wide range of gases, including NH<sub>3</sub>, and Water, alcohol, benzene, smoke, and carbon dioxide (CO<sub>2</sub>) emissions.

##### C. Software required

- Protocol – MQTT / HTTP

The API is a publish / subscribe protocol that allows the edge of network devices to publish data to the broker. Clients connect to broker, which mediates communication between the 2 devices. Each unit may subscribe to or to sign up for a specific topic. When a client publishes a cartoon about a topic, the broker forwards the message to all subscribed clients. The API allows you to collect, transmit, and analyze the collected data.

- Amazon AWS

Amazon Web Services (AWS) is Amazon's cloud-based web hosting platform that offers flexible, reliable, scalable, easy-to-use and cost-effective solution.

- Android

Android is an open source Linux operating system for mobile devices such as smartphones and tablet computers. Android offers a unified approach to the development of applications for mobile devices which means developers need to develop not only in the Android phone, and on their application needs to be able to work on a variety of devices that run on the Android platform. The source code for Android is available under free and open source software, the State oil company of the Republic of Azerbaijan in the software.

FIGURE 1.2 :IOT WAREHOUSE MONITORING SYSTEM

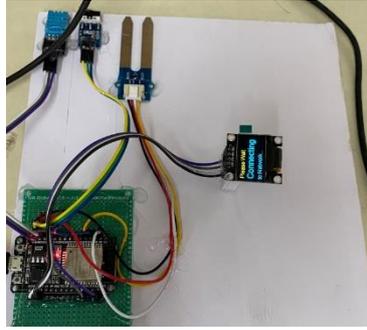


Figure 1.3 : IOT Warehouse Monitoring System

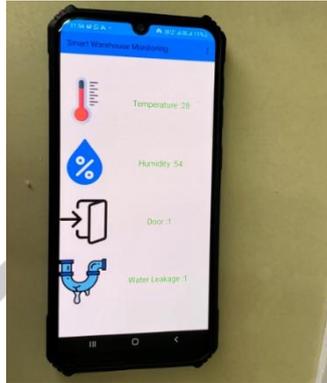
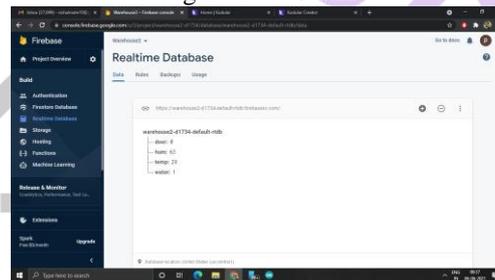


Figure 1.4 : Cloud



#### ADVANTAGES

This information will be made available at any place and at any time. To make it possible for the farmers to make better-informed decisions that will increase their profits.

#### CONCLUSION

This work shows that the development and implementation of a platform for monitoring the operation of a food storage system. In addition to the system in order to create new services and products, there are low-cost solutions based on internet of things.

#### ACKNOWLEDGMENT

It is matter of great pleasure for me to submit this Project report on "IOT Warehouse monitoring system" as a part of curriculum for Master of Engineering (Electronics and Telecommunication)" with specialization in Embedded and VLSI " degree of Pune University. I am thankful to my Project guide Dr. Sunil Morade, in Electronics and

Telecommunication Department for having permitted me to carry out this project work not only that but has also helped me by his constant encouragement and able guidance. I am also thankful to Dr. Nandurkar, Principal of Institute, Prof Chandwadkar., Head of Electronics and Telecommunication Department for their valuable support.

I take this opportunity to express my deep sense of gratitude towards those, who have helped us in various ways, for preparing my project.

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