UE17CS490A – Capstone Project Phase – 1

# End Semester Assessment

Project Title : Monitoring and Controlling the Crops in Warehouse using IOT
Project ID : PW21RBS01
Project Guide : Prof.Rachana B S
Project Team : 1279_2403_2436

# Agenda

- Problem Statement
- Abstract and Scope
- Literature Survey
- Suggestions from Review – 3
- Design Approach
- Design Constraints, Assumptions & Dependencies
- Proposed Methodology / Approach
- Architecture
- Design Description
- Technologies Used
- Project Progress
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## Problem Statement

- Nowadays ranchers are going up against enormous hardships due to some amassing essentials which are not being fulfilled and in light of nonattendance of induction to sensible refrigeration structures.
- From now on we have devised an undertaking where all the harvests are being checked ceaselessly with the help of sensors.
- Fundamentally this undertaking utilizes raspberry pi which goes probably as a microcontroller similarly as a specialist and prefers heat, moistness, smoke and a light sensor.
- All of these sensors can be easily controlled through a web application.
- This endeavor makes us screen constantly and grants the customer to control the movements at whatever point required.

## Abstract

Internet of Things (IoT) is a concept that allows physical objects with computational and sensory support to connect with each other and access services across the Internet.

The IoT idea was introduced to connect devices through the Internet and facilitate access to information for users. The wide range of potential applications of IoT also includes agriculture, where extensive use of IoT is expected in the future. The aim of this work is to present the IoT concept as a basis for monitoring and controlling the yield in warehouse. This project uses raspberry pi which acts as a microcontroller as well as server and sensors like temperature, moisture, smoke and a light sensor. All these sensors can be easily controlled with the mobile through a web application developed using python. This project help us to monitor in real time and allows the user to control the changes if required.

# Scope

- **Aim:**

  Our Aim is to provide Ranchers yield with good storerooms to reduce food misfortunes and increment food safety. Reducing food misfortune which will consequently build high amounts of food availability.

- **Benefits:**

  The vital advantage of this cycle is that it permits the Stakeholders to comprehend the present status of the undertaking, the means taken, and financial plan, schedule, remote monitoring, reduced employees and increase in food availability

- **Usage:**

  Producers, Dealers, Traders, Distributors for good storage facility.

## Literature Survey

**Title:** Smart Warehouse Monitoring Using IOT,2019

**Authors:** K.Mohanraj,S.Vijayalakshmi,N.Balaji,R.Chithra kannan,R.Karthikeyan,2019, IJEAT

**Abstract:** This project is to catch heat, dampness, quake and fire related data utilizing sensors and send cautions utilizing IOT innovation. The issue looked by the Central Warehouse Corporation is limit loss of food grains on account of environmental changes Storage loss of capacity loss of food grains are being noticed and controlled through quality check chips away at including typical and discontinuous compound treatment, recording of mugginess dampness and other key limits, customary review, proper documentation age examination, sanitization, condition of being of storeroom. By executing the new present day apparatuses for storeroom association structure incorporates different plans of motivations and wants from various financial specialists. Diverse storeroom systems during execution fail to meet their

## Literature Survey

methods. By then the endeavor risk is given after execution. Due to ill-advised arranging the execution fizzled. So we need to complete a versatile and progressing course of action to execute a storeroom structure.

- **Methodology :**
  - The different sensors used are heat and dampness sensor and piezo vibration sensor and IR sensor.
  - The information collected from the sensors is sent to the Raspberry Pi microcontroller.
  - The collected information can be displayed in an LCD display.
  - The Raspberry pi has an interior Wi-Fi module through which the IoT is associated. It has a SD space which stores a restricted scope of each sensor.
  - Now the yield stored in warehouse information collected by the sensors is updated periodically through the controller.

## Literature Survey

The controller checks at standard traverses when the scope out performs it gives an alert. We can screen this by associating with HDMI.

- **Future Work:**

  - The feature of this technique is that it has further developed innovation with massive highlights which is fused in the framework itself.
  - The outline regarding the smart warehouse system and fire sensor and web camera to pass the information to Raspberry Pi microcontroller via LCD display as SMS/E-Mail.
  - Therefore, in future it can be automated for warehouses using IoT. In future the automatic system can be used for irrigation purposes.

## Literature Survey

**Title:** IOT Based Smart Real Time Agriculture Warehouse Monitoring And Control System Using Raspberry Pi,2019,IJRECE

**Authors:** Dr.R.M. Rewatkar , Mr. Akash V. Gulhane , Ms. Ashwini S. Mungale, Ms. Nikita M. Dhengare , Ms. Pooja P. Thakare , Ms.Prajakta D. Sabane

**Abstract:** In Warehouse, ranchers are keeping their horticulture items to build the lifetime of the capacity materials. Ranchers should know if their capacity items have been harmed or not. Consequently our venture plans to make agribusiness shrewd ongoing checking and controlling framework with the assistance of PC, PC and most recent advances.

- **Methodology :**
  - Web-application module is utilized to keep data about the adjustments in the atmosphere. Raspberry Pi is essentially a gadget planned which goes about as a microcontroller just as a worker.

## Literature Survey

- Humidity Sensor otherwise called hygrometer faculties and reports both dampness and air temperature.
- Relays are essentially switches which work both precisely and electrically with an electromagnet. It works when there is a low-power sign and this data is helpful to control the circuit.
- Smoke sensors are utilized to recognize smoke dependent on the voltage levels. More smoke demonstrates more noteworthy voltage.
- Essential guideline of a LDR is photograph conductivity. It is an optical marvel wherein the materials conductivity is expanded when light is consumed by the material.

- **Future Work:**
  - We can use a web camera to capture images or video.It will help to see the actual condition of the product.

Currently, the system is monitoring only four parameters and controlling two parameters.

## Literature Survey

**Title:** Iot Instrumented Food and Grain Warehouse Traceability System for Farmers, 2020,IEEE Xplore.

**Author:** Susmita Banerjee, Anil Kumar Saini, Himanshu Nigam, Vijay

**Abstract :** Food stockpiling assumes a significant job with regards to food safety that is influenced by food misfortune and food wastage. The proposed framework should permit an IoT empowered observing framework to convey in distant regions where the openness is extremely least for ranchers with food storerooms to decrease food misfortunes and increment sanitation.

**•Methodology :**

- The main component of this system is ESP-32. They have used various sensors such as PIR sensor, Vibration Switch, Gas sensor DHT11 sensor and Fire sensor. The framework comprises a sensor hub, microcontroller hub, web worker. Microcontroller accumulates sensor values from the sensor hub and sends it to

## Literature Survey

GSM module, later it communicates to the web worker. GSM is an advanced cell innovation utilized for sending voice and information. It acts as a correspondence interface among microcontrollers and web workers. Sensors are responsible for recognition of different inconsistencies in a stockroom or cold-stockpiling conditions. Certain food items, for example, food grains need appropriate lighting to look after quality, such area LDR are put. Humidity sensor detects high dampness in a distribution center climate. Furthermore, send the value into the microcontroller. Temperature sensor detects high temperature in a stockroom and sends these qualities into the microcontroller. Smoke alarm distinguishes smoke if in the event that fire occurs in the stockroom and sends these qualities into the microcontroller. Load cell is utilized to check weight of food items, it occurs if there should be an occurrence of rodent warming and corruption of food items.

## Literature Survey

- **Future Work:**
  - As IoT has entered the horticulture field, this advancement will be successfully open to ranchers.
  - Later on we can use different sensors with high affectability, high flexibility, and high unwavering quality which will be made and which can be valuable to secure the grains and vegetables.

## Literature Survey

- **Title:** Iot Based Food Monitoring System in Warehouses,2020,IRJET
  **Author:** Shivani Bhandari , Pooja Gangola , Shivani Verma , Surekha K Si
- **Abstract:** India is the country where the agricultural sectors play a major role in the economy. Every year farmers face numerous problems due to the storage requirements, lack of proper monitoring of the food stored. Warehouses are used for storage purposes. Only a small part of the food grains are stored in the state run warehouses. A large part of the crops is left without proper storage facilities. So the IoT based system for monitoring of food grains not only aims at implementing a multi-parametric system which helps in preventing the loss against various factors like moisture, aging and decaying but also consumes less time and cost effectively. This paper presents a food monitoring system in warehouses using raspberry pi and various sensors that continuously monitor the various factors which may affect the food quality. The Thing Speak is used as a cloud that helps in the visualization of data.

## Literature Survey

- **Methodology :**

  In this paper they have used different sensors like heat sensor, dampness sensor, Light sensor, MQ3 sensor and give different types of notifications to the warehouse manager about the conditions so that the manager can take action. The actions taken by the manager will help them increase the survival of food little longer and proper use of resources will be done, which will make the environment friendly also. Data from different parameters can be seen on computers and Smart Phones. And they have used Raspberry Pi which is Wi-Fi enabled and also thing speak to store the data in the cloud.

- **Future Work:**

  There are 3 methods to notify the directors, with the assistance of LEDs visual caution, with the assistance of Blynk versatile application that can follow live feed too and the diverse alarm sound with assistance of small buzzer.

## Literature Survey

An organization where each segment will have the option to think exclusively, will recover information from cloud to likewise improve their choices each time with the assistance of information mining algorithms. We can associate this entire framework to Soracon Lagoon dashboard to get further inside and out examination with the of GSM module and IoT SIM card on our own computers. Alarm structure can be used to alert the supervisors if there emerge an event of any unusual exercises, this can achieved by using sensors around the field and presenting a live perception in order to perceive remarkable conduct by image processing.

## Literature Survey

- **Title:** Intelligent Grain Storage Management System Based on IOT

**Author:** Ajay Doltade, Ankita Kadam, Sayali Honmore, Sanjeev Wagh

- **Abstract:** India is the tremendous nation attached to horticulture most generally where in India a large portion of individuals practically 70% individuals lives relies upon agribusiness. Where capacity of food grains is the most significant part and plays an essential role. Indian economy though while putting away grains the temperature, dampness etc., their focus is more significant and where these components additionally could influence the nature of food grains.

The conventional techniques just cutoff to a portion of the testing climate condition approaches, where different variables must be distinguished or checked independently. The strategy for observing the grain stockpiling progressively is planned by utilizing some IOT devices. The result of this paper has numerous attributes, for example, discovery and simple anticipation helps in improving the nature of the food grain put away and lessens the wastage of grains put away in the stockroom.

## Literature Survey

- **Methodology :**

  The Node MCU ESP8266 is the microcontroller which goes about as the focal control part.DHT11,MQ135,MQ2and PIR are the sensors utilized for detecting and accepting the data. Buzzer is utilized for the alarming the managers. Blynk application is utilized for warning conveyed by blynk cloud.

- **Future Work:**

  Need to monitor the temperature and humidity regularly.

## Literature Survey

### Drawbacks:

- Internet connection is very important in case a poor network system fails to control and monitor the system on time.
- Providing security to the warehouse is also more important
- Data security is another drawback
- Requires 24/7 power supply failure in regular supply of power will damage the grains

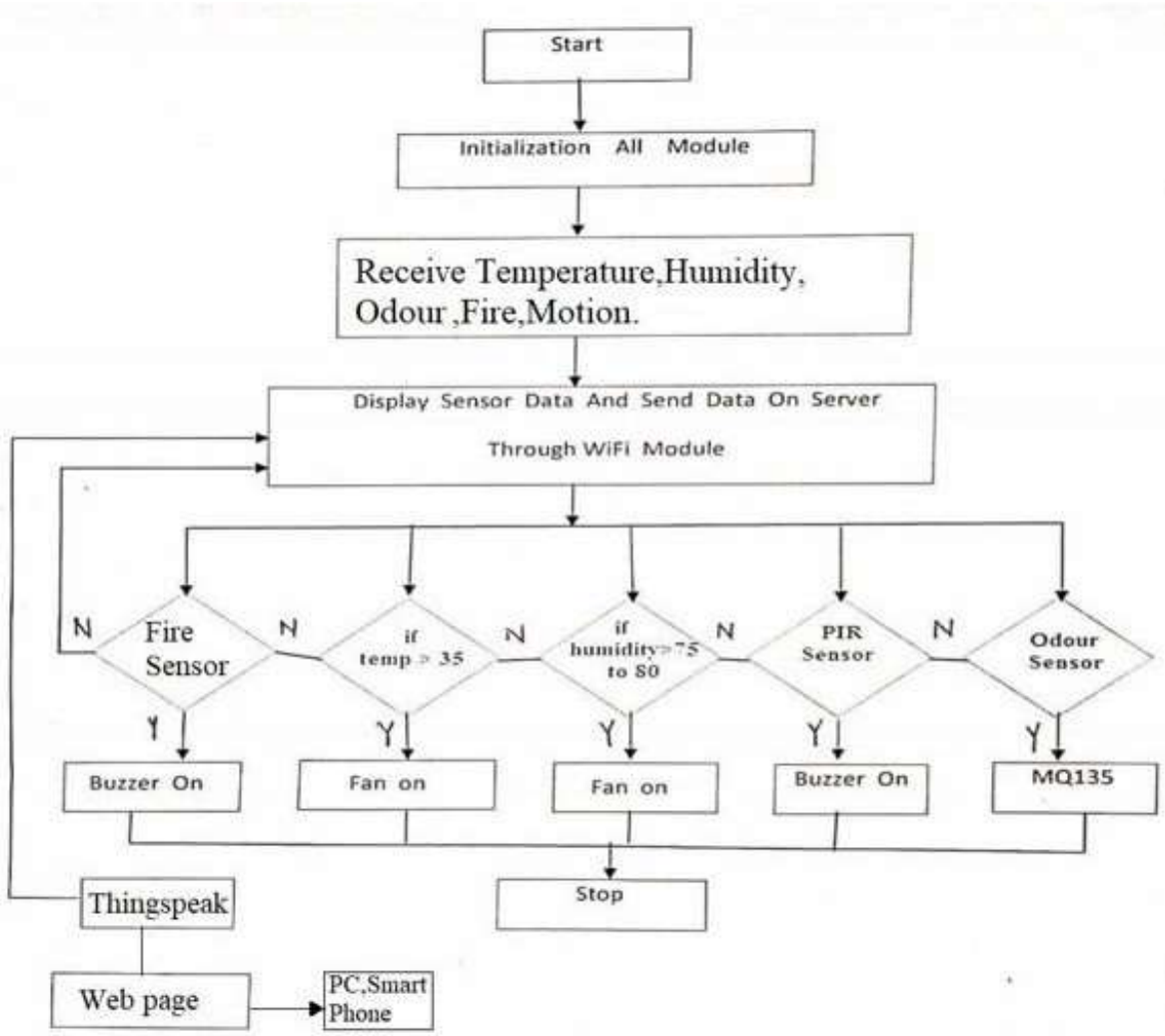
### Conclusion:

- Other than setting up a food support framework, it proposes a minimal effort arrangement dependent on IoT.
- This framework advances the updating of the stockroom, the system framework maintaining a strategic distance from food squander and pointless financial misfortune.
- By execution and usage of the current innovation the stock administration for the cutting edge storage facility, the system is proposed with IOT empowered sensor innovation.

# Suggestions from Review - 3

- Add more content in Literature Survey
- Add parameters for Food items

# Design Approach



# Design Constraints, Assumptions

## Constraints

1. Revenue and Affordability.
2. Power Supply.
3. Communication Range.
4. Harsh Device Environment.
5. Quality and Availability of Data.
6. Quality of Wireless Link.

# Design Constraints, Assumptions

## Assumptions

1. Gracefully merchandise into the commercial center by having the option to store products when flexibly surpasses request and afterward delivering them when request surpasses.
2. Keeping up reliable stock levels causes costs to remain stable, making it simpler for organizations to estimate creation, benefit and misfortune.

# Risks

1. The Security  Factor
2. Technical Failure and False Alarms
3. Chances of Raspberry pi getting Damaged
4. Data Security and Privacy
5. Not in time alerts

## Security

Adoption of IoT in the warehouse has innumerable benefits. However, there are several security and privacy issues associated with it. Since a huge amount of information is stored in the IoT systems, it becomes really difficult to protect the data.

Cyber security threats such as data attacks, cloud data leakage, malware injection, data fabrication, third party attacks are some of the major security challenges that the managers can face in smart farming. Any hacker can easily steal their raw data from their system. So proper care should be taken that all data is protected as best as possible, this normally would mean using encryption when transmitting and storing the data, but it also applies to the methods used to interchange the data - hardware and software.

# Design Details

## Reliability

Reliability is critical for efficient IoT communication, because unreliable sensing, processing, and transmission can cause false monitoring data reports, long delays, and even data loss, which would reduce people's interest in IoT communication. Therefore, the rapid growth of IoT communication demands high reliability. However, these deployments, as IoT implementations, depend heavily on the Internet connectivity, therefore on the network infrastructure.

## Maintainability

In order to achieve optimal cost in the life cycle of the IoT, maintainability must be considered in the design phase of the IoT. Maintainability refers to the ability for an intelligent system to be seamlessly and easily uncoupled, fixed and modified without causing an obstruction in the system processes or functionality. To evaluate the maintainability property of the IoT system,

## Design Details

in case of a problem, the system should allow easy replacement of faulty components without loss of service. Therefore, to characterize IoT systems as highly maintainable, they have to enable maintenance tasks to be completed effectively, efficiently and with satisfaction.

## Proposed Methodology / Approach

- When the crops are stored it might get spoiled in few days due to humidity and temperature.
- Using sensors we can monitor the temperature and humidity and using control systems we can control the humidity and temperature.
- And we can calculate within how may days the crops will get spoiled in specific temperature and humidity.
- What is the best temperature and humidity points for specific crops.

## Proposed Methodology / Approach

- Sensing:
  - Temperature and Humidity sensor
  - Detecting Fire
  - Detecting Motion
  - Detecting Gas
- Actuators:
  - Temperature Control System
  - Humidity Control System
- IoT Structure:
  - The cloud technology(Thing Speak)

## Proposed Methodology / Approach

- Web-application module is utilized to keep data about the adjustments in the atmosphere
- The information collected from the sensors is sent to the Raspberry Pi microcontroller.
- Raspberry Pi is essentially a gadget planned which goes about as a microcontroller just as a worker
- DHT22 Sensor otherwise called hygrometer faculties and reports both Humidity and air temperature.
- Relays are essentially switches which work both precisely and electrically with an electromagnet. It works when there is a low-power sign and this data is helpful to control the circuit.
- Fire sensors are utilized to recognize smoke dependent on the voltage levels. More smoke demonstrates more noteworthy voltage.

# Proposed Methodology / Approach

- Motion sensors are utilized to detect movement near warehouse.
- Now the yield stored in warehouse information collected by the sensors is updated periodically through the controller.
- The controller checks at standard traverses when the scope out performs it gives an alert. We can screen this by associating with HDMI.

## Architecture (if applicable)

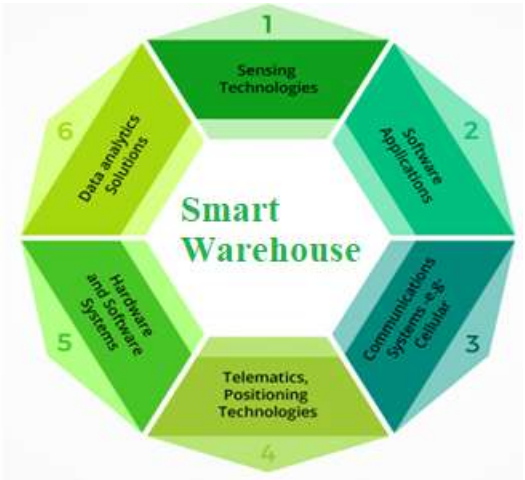
- **Physical Implementation:**

  Execution of Sensors, Actuators and Micro-Controllers Implementation of Network Equipment

- **Subsystems:**
  - **Sensing**: Collection of Data (environment in warehouse) through Sensors.
  - **Data Communication**:
    - Communication between the central and wireless sensor nodes. Sensor Data is collected into sheets, various Databases, Cloud Storage.
  - **Visualization:** visualization, processing and manipulation of data.
  - **Data Analysis**:
    - Data is analyzed using different algorithms. Through this the system is capable of decision making and execution based on manipulating sensor data.

## Architecture (if applicable)

- **Circuit Design:**
  - **Wireless Sensor Nodes**: Observing and Recording the states of being of the climate and putting together the gathered information at a central location.
  - **Central Node**: consists of Raspberry Pi, GSM Module, Exhaust fan.



# Architecture (if applicable)

Our Choice of Architecture is Layered Architecture. layered Architecture consists of :

•

**Application Layer** - Because of the concern of energy consumption and stern computation involved by the IoT devices there are several lightweight protocols that are adopted on the application layer such as MQTT, COAP, AMQP, and HTTP. The mentioned protocols can be decreased or increased according to the requirement. The Raspberry-Pi Wi-Fi module uses the protocol HTTP in the application layer. HTTP is a well-known web messaging protocol based on the request/response architecture.

## Architecture (if applicable)

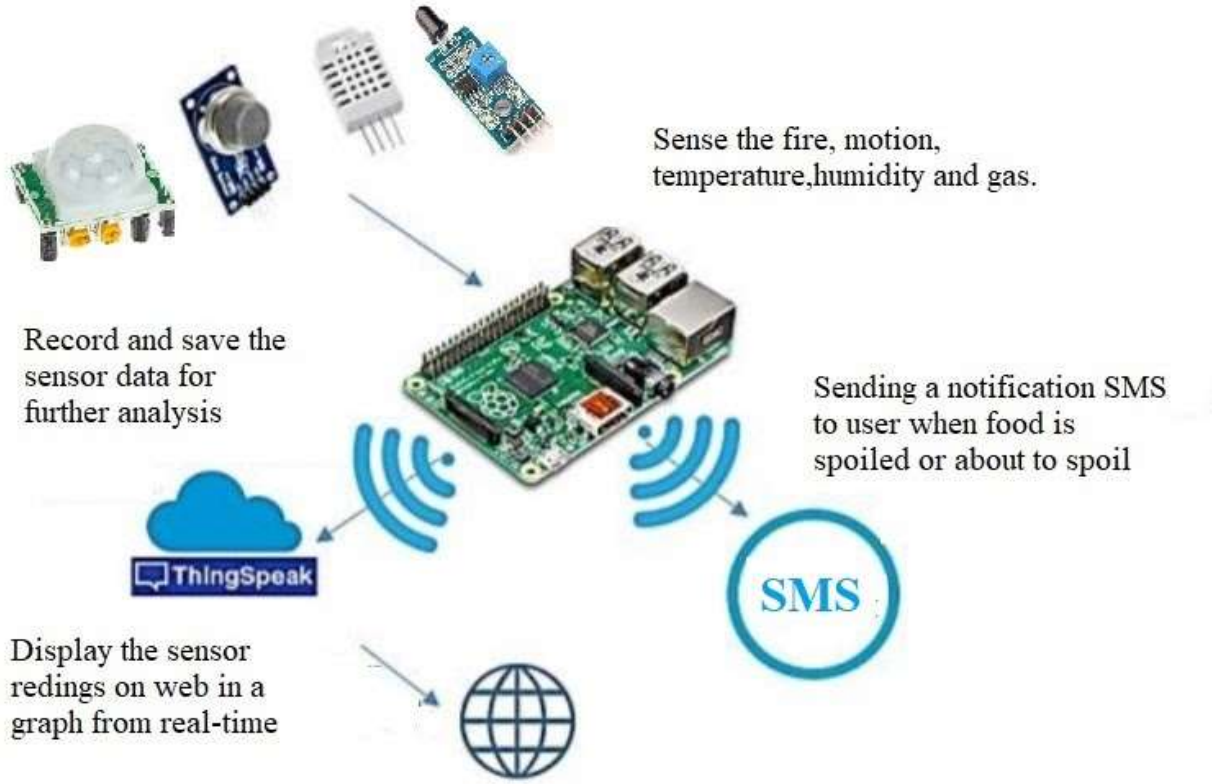
**Pros:**

- Reduced investment risk.
- Flexibility to design to specifications.
- Greater direct control on warehousing activities.
- If the volume is sufficient, this may workout cheaper.
- Our proposed solution uses a limited number of sensors required for operation and connected using wire networks which are less vulnerable to security.

**Cons:**

- Cost of manpower.
- Administrative problems.
- Warehouses cause high prices of goods due to rent charges by owners of the warehouse.

# Architecture (if applicable)



# Architecture (if applicable)

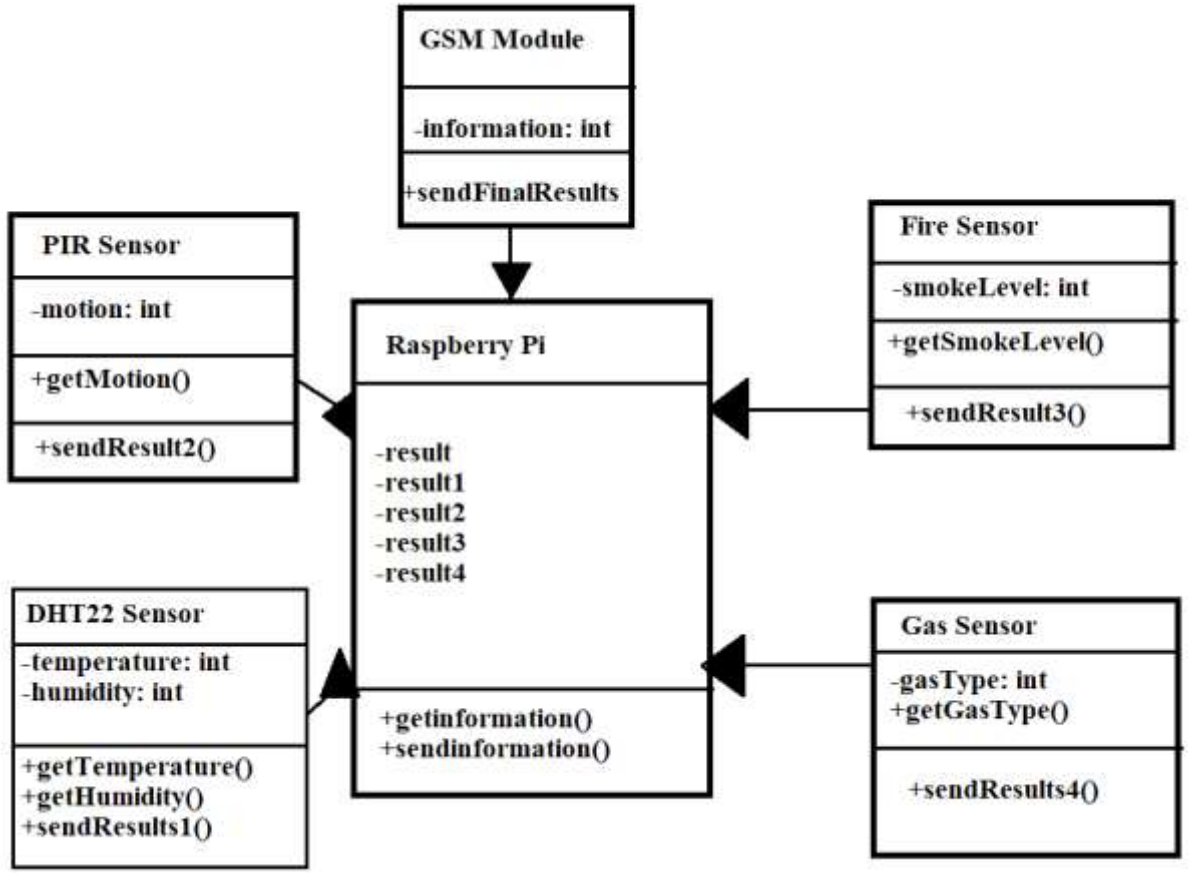
- Remote sensor networks enable us to assemble data from detecting gadgets (sensors) and send it to the core servers. Data accumulated through the sensors gives information about different biological conditions to screen the complete framework appropriately. Observing the natural conditions or yield profitability isn't the ideal factor for the analysis yet there are various factors which impact the yield's stored in warehouse, for example, movement of an undesirable object or food. Likewise, IoT ensures capable arranging of confined assets which ensures the best utilization of IoT to improve productivity.

# Architecture (if applicable)

- It finds any Temperature, humidity difference in the air and also food which is spoiled through the built application so that he can take care of the food stored in warehouse, Mainly the data is stored on the database through the cloud(Thing Speak) & through the GSM module the signal(message) is sent to client mobile regarding the indication of the temperature, humidity and food spoilage.
- Food spoilage detection is done by sensing the gas in the air or using the pre-existing dataset.

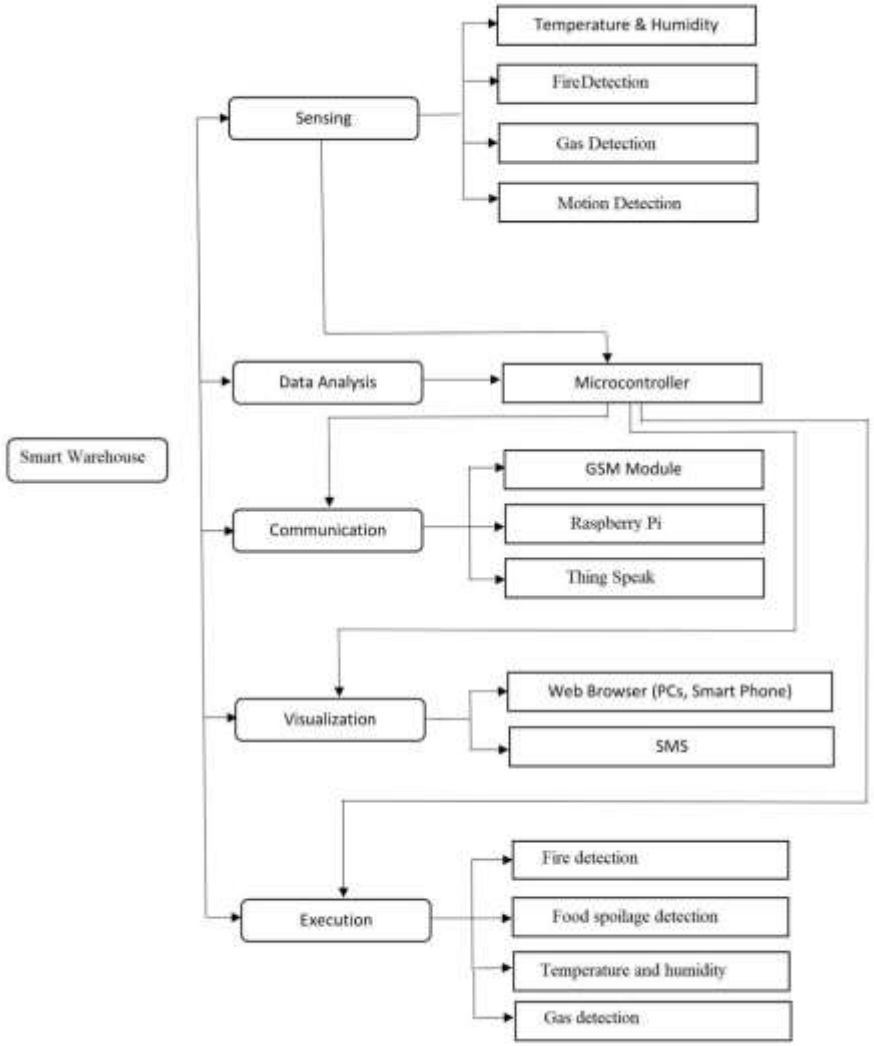
# Design Description (if applicable)

## 1. Master class diagram



# Design Description (if applicable)

## 2. State Diagram



## Design Description (if applicable)

### 3. Report Layouts

**Introduction:** Smart Warehouse is an emerging concept that refers to managing food using modern Information and Communication Technologies to increase the quantity and quality of products while optimizing the human labor required. ...

**Design Consideration:** Design goals are to build a system capable of Sensing, data Communication, data analysis and also this section explains about the background work-Circuit Design, physics Implementation, Architecture Choices, pros and cons of architectural choices, Constraints and risks of the project.

**High Level System Design:** This section explains about the system design-UML, Runtime Diagram, Security.

## Design Description (if applicable)

**Design Description:** This block helps us to understand the design and process in a clear view by providing us the master class diagram and state diagram, Package and deployment diagram.

**Help:** This section gives a brief description about the technical, hardware help planned to the system.

**Design Details:** It provides the characteristics of the process, systems we considered for the project.

## Design Description (if applicable)

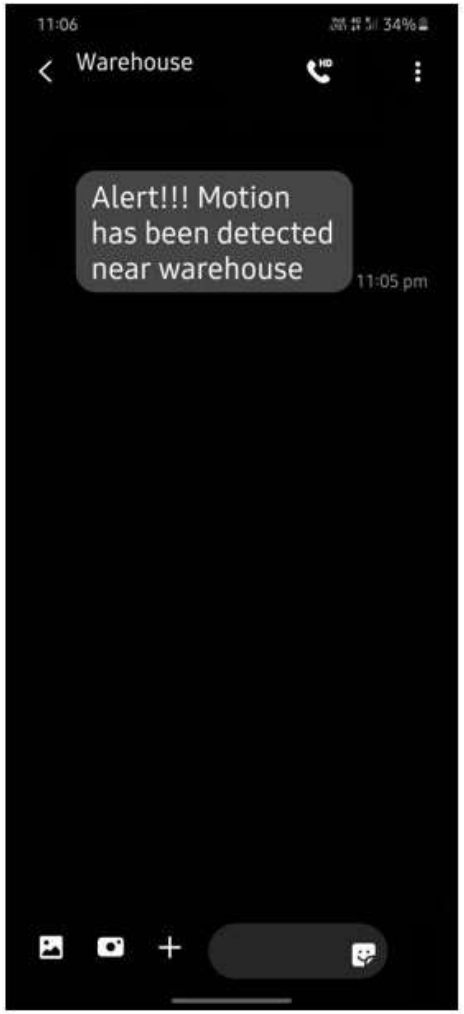
### 4. External Interfaces

Login.html - The first page of the UI, where the user logs into his profile

FrontPage.html - Display the different projects and tasks currently run by the user

The system sends an Alert message when any motion and it will also send alert messages when food is about to spoil or spoiled, temperature goes below the requirements or humidity goes above the requirement.

# Design Description (if applicable)




# Technologies Used

Technologies we plan to use are:

- Raspberry Pi
- Temperature and Humidity Sensor
- Gas Sensor
- PIR Sensor
- Fire Sensor
- Buzzer
- Relay Control
- Bulb
- Exhaust Fan
- GSM Module

# Project Progress

What is the project progress so far?

- Completed front end of the web page
- Visited  two warehouses
- Research on sensor and food parameters
- Raspberry pi booting but we are getting an error
- Completed our literature survey.

What is the percentage completion of the project?

We have completed 40% of our Project

# References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# Thank You