EFFECTIVE FOOD GRAIN LOSS REDUCTION TECHNIQUE USING IOT

[1]A S Keerthi Nayani, [2]CH.Sekhar, [3]Aruna Kokkula
[1]Assistant Professor, [2]Assistant Professor, [3]Assistant Professor
[1]Electronics and Communication Engineering,
[1]Matrusri Engineering College, Hyderabad, India.

Abstract: Internet of Things (IoT) is one of the affirmative platforms to implement a large data analytics task which comprises the way to exploits networking, detecting, huge information, and computerized reasoning innovation to convey finish frameworks for an item or administration. These frameworks permit more prominent straightforwardness, control, and execution when connected to any industry or fr.In this paper, we are going to discuss about loss due to atmospheric moisture beyond threshold results in infestation etc and hence damages the food grain. Those losses can be reduced effectively with support of various sensors to detecting the status of food grains stored in the Central Warehousing. Based on moisture and temperature data captured, the software should do appropriate data analytics and send timely alert to concern officials of CWC for mitigation and remedial actions arising due to moisture and temperature inside the warehouse. This paper emphasizes the usage of IoT which enables the Central warehouse centers to avoid the losses of food grains.

IndexTerms- Moister, Temperature, Sensors, IoT Technology.

I. INTRODUCTION

Taking care of the sustenance demand of a quickly expanding worldwide populace is developing as a major test to humanity. The populace is relied upon to develop to 9.1 billion individuals by the year 2050, and around 70% additional nourishment creation will be required to encourage them [1]. A large portion of this populace rise is relied upon to be credited to creating nations, a few of which are now confronting issues of yearning and sustenance uncertainty. Expanding urbanization, environmental change and land use for non-sustenance edit generation, heighten these worries of expanding nourishment requests. Over the most recent couple of decades, a large portion of the nations have concentrated on enhancing their rural generation, arrive utilize, and populace control as their arrangements to adapt to this expanding sustenance request. In any case, postharvest misfortune (PHL), a basic issue, does not get the required consideration and under 5% look into subsidizing has been assigned for this issue in earlier years . Around 33% of the nourishment delivered (around 1.3 billion ton), worth about US $1 trillion, is lost all around amid postharvest operations consistently. "Sustenance misfortune" is characterized as nourishment that is accessible for human utilization however goes unconsumed. The answers for diminish postharvest misfortunes require generally humble speculation and can bring about significant yields contrasted with expanding the harvest creation to take care of the sustenance demand.

CWC(Central Warehousing Corporation) is a warehousing agency. It offers services like storage and handling of goods, transportation of goods. This project benefits the government as there is difficulty in handling large number of goods from different sectors of industries. As we know there are huge numbers of commodities that include Agricultural produce, Industrial raw materials, finished goods and variety of perishable items where we can observe storage loss at huge amount. This sort of storage loss of quality outcome of food grains and perishable goods can be controlled through quality control practices that include chemical treatment, sanitation, age analysis, regular inspection and many more. Sometimes storage loss can also be observed due to atmospheric moisture beyond threshold results. So, a preferable low cost IT solution is around Internet Of Things (IOT) Sensor and IOT data integration. As a part of solution we are creating an IOT dashboard that includes all information related to moisture, temperature, fire and earthquake**.**

II. PROBLEM STATEMENT

Post-harvest losses:

Seeds of low quality, deficient cultivating practices, or creepy crawly assaults in the field can incite misfortunes of items even before their reap. Be that as it may, we are worried here just with counteractive action of misfortunes after the collect.

Losses in quality

Criteria of value fluctuate broadly and include the outside angle, shape and size, as much as the odor and taste. In such manner, the social contemplations with which weight control plans and dietary patterns are instilled can't be disregarded.A clean healthy item is of essential significance in advertising. By grasping a modest bunch of grain from a pack, for instance, a tradesman can rapidly check whether it emits a floury tidy and can thusly reason regardless of whether it originates from an invasion by creepy crawlies. Similarly, a terrible stench can lead him to presume rat assaults, which can be affirmed by the nearness of rodent or mouse dung or hairs. Misfortunes in quality are in this way confirmed by a decline in the market estimation of the item. These misfortunes are quantifiable just on condition that criteria or benchmarks of value have been already settled.Basedon target criteria, the nature of the items can be assessed by genuinely confounded tests, estimations and research facility examinations.A considerable lot of the criteria embraced depend on assessment of principles identified with the physical state of the grain and to its sustenance, nutritive and germinative esteems. In different nations, quality evaluations depend on the general chief as per which grain must be "healthy, sound, of market quality and unscented".

Certain in this definition are the central criteria for assessing the nature of a given cluster of grain; these include:

- Moisture Content: reasonable for the capacity or further treatment of the item;
- Colour: homogeneous and fitting to the sort of item under thought;

- Odour: it must not indicate that any biochemical change is going on;
- Cleanness: the quantity of debasements must fit in with set up models of value;
- Infestation: the nonattendance of bugs or other living life forms must be discovered.

For the most part, numerous criteria join to characterize the nature of the items, and they likewise consider social perspectives identified with group dietary patterns. In Senegal, for instance, broken rice is very prized by customers; hence, the level of breakage, as a standard of rice quality, clearly has less significance than in different settings.

Loss in quality are for the most part the aftereffect of mechanical requirements experienced by the item, the activity of bugs (creepy crawlies, rodents) and small scale creatures (molds), or the concoction changes delivered inside the grains under the impact of natural conditions (temperature, mugginess, length of capacity).

Problem Identified

1. Central Warehousing Corporation (CWC) is into scientific storage and handling services for more than 400 commodities include Agricultural produce, Industrial raw-materials, finished goods and variety of hygroscopic and perishable items.

2. Storage loss of food grains and perishables goods are being controlled through quality control practices including periodic chemical treatment , recording of moisture and other parameters, proper documentation , regular inspection , age analysis , sanitation , physical condition of warehouse.

3. Further storage loss due to atmospheric moisture beyond threshold results in infestation etc and hence damages the food grains/perishables.

III. PROPOSED SOLUTIONS AND METHODOLOGY

Expected deliverables:

- Low cost IT solution preferably around Internet of the things (IoT) sensor and IoT data integration to existing application software. The sensor is expected to auto capture the atmospheric moisture and temperature inside the warehouse.
- Based on moisture and temperature data so captured, the software should do appropriate data analytics and send timely alert to concern officials of CWC for mitigation and remedial actions arising due to moisture and temperature inside the warehouse. Additionally, IoT sensor can also capture fire, earthquake etc and can alert the respective nearest authority like Fire Station, Hospital, and Police besides alerting CWC officials for mitigation. Sample data: Data to either simulated participants or can visit warehouses for sampling.

The following are the various sensors can be used to detect and monitor the status of food grains stored in the central warehouse.

Sensor to Detect Moisture Level in Room:

Stickiness is the nearness of water in air. The measure of water vapor in air can influence nourishment grains in the event that it is more than the required level .The nearness of water vapor additionally impacts different physical, synthetic, and natural procedures. Thus, stickiness detecting is essential, particularly in the focal stockpiles' of nourishment grains.

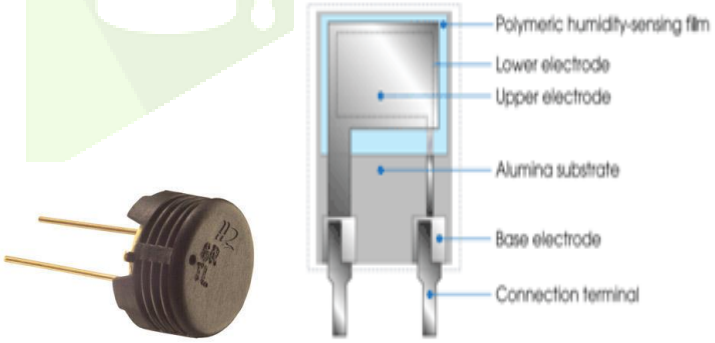

Fig1. Humidity Sensor and capacitive type humidity

Controlling or observation humidness is of preponderant importance in several industrial & domestic applications. within the semiconductor trade, humidness or wetness levels has to be properly controlled & monitored throughout wafer process. In medicalapplications, humidness management is needed for metastasis instrumentation, sterilizers, incubators, pharmaceutical process, and biological merchandise. Humidness management is additionally necessary in chemical gas purification, dryers, ovens, film desiccation, paper and textile production, and food process. In agriculture, measure of humidness is vital for plantation protection (dew prevention), soil wetness observation, etc. For domestic applications, humidness management is needed for a living setting in buildings, preparation management for microwave ovens, etc. all told such applications and plenty of others, humidness sensors square measure utilized to produce a sign of the wetness levels within the setting.

Sensor to Detect Temperature(IC LM 34/35)

Temperature sensor IC LM34/35, are used in various applications to detect temperature variations. These devices can switch off / on circuits when the temperature varies from the normal set level. LM 34 and LM 35 Integrated Circuits are precision temperature sensors widely used in temperature sensing applications. LM 34 senses temperature in Fahrenheit range while LM 35senses temperature in Celsius (Centigrade) range. The output voltage of these sensors is linearly proportional to the temperature.

Fig3. Temperature Sensor

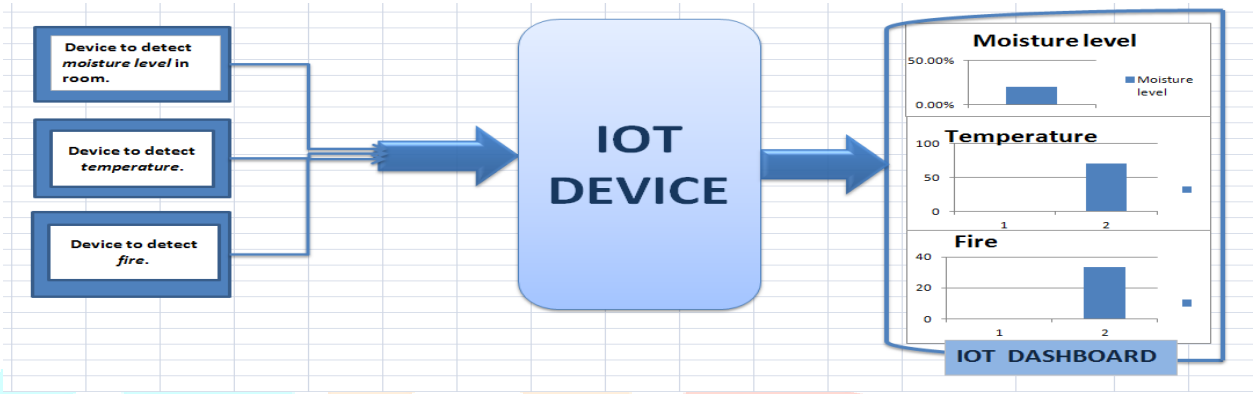

Fig 4: Working Model

IV. WORKING MECHANISM

The accompanying table demonstrates the degrees of dampness content considered fitting for good collect conditions and the attributes allowing affirmation of physiological development[2].

Table -1

GRAINS	MOISTURE	PHYSICAL CHARACTERISTICS
Rice	22-28%	The panicles bend with their own weight, yellowed hulls, full grains, neither too ripe (cracked), nor too green.
Maize	23-28%	Cobs almost dry, hard and glassy kernels resistant to scoring with the thumbnail, black dot in the caryopsis.
Sorghum	20-25%	Dried stems and leaves, hard grains resistant to the thumbnail, glassiness depending on variety.
Beans	30-40%	Pods ripe and yellow, shells dried, skins of kernels easily detached.
Groundnuts	30-35%	Leaves yellow, shells dried, skins of kemels easily detached.
Sunflower	9-10%	Upper leaves dry and flower faded.

As mentioned above sample scenario, the following process need to implement to achieve the desired level of room temperature.

Considering the need of modern technology the smart central warehouse need to ready to store the food grains and to reduce the losses due to various atmospheric conditions To avoid the losses due to normal storage places such problems in above existing system we are planning to design IOT based Smart Warehouse and Monitoring System. This system monitors the various things such as temperature, humidity etc. Time to time levels of respective measures collected and sends to the central control system via a webpage.

For this the system uses various sensors mentioned above placed over the all the rooms to detect the levels and compare it with the required. Once when the level reaches the threshold limit the system puts on the buzzer/ alarms the employees working in that particular region. Thus this system helps to keep the roomat desired levels.

- Real time information of the room's level will be displayed in web browser.
- Intelligent sensors placed at the rooms which notify about the temperature, humidity content in the bins.
- The web application can also be operated using any devices.
- This system is adaptive and hence can adapt to various new technologies.
- This process reduces cost and resource optimization.
- Improves quality and effective usage of rooms.

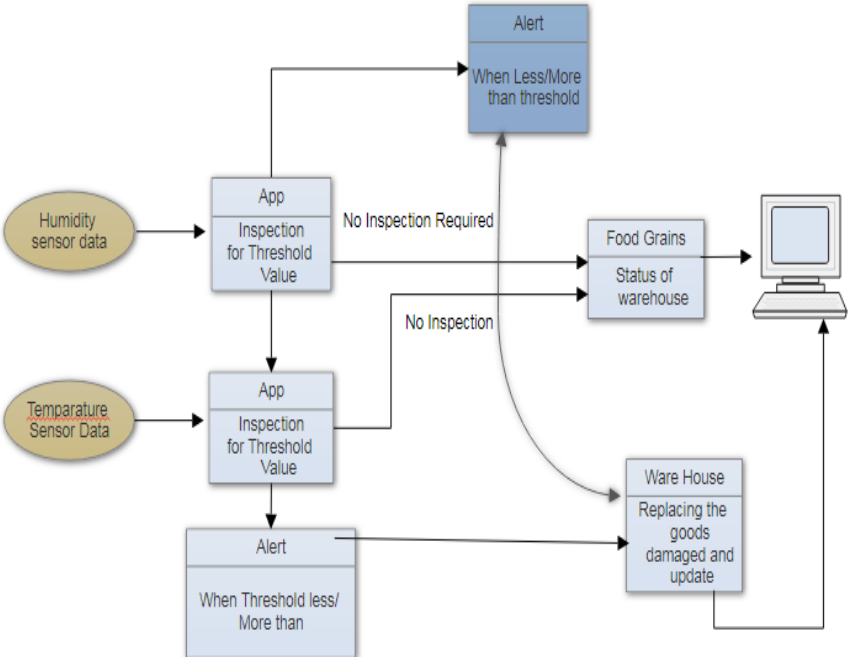

Fig5: Work Flow of Detecting and Monitoring the Warehouse

V. RESULTS DISCUSSION

Warehouse monitoring system is designed and implementation is done on IC **LM 34/35**development board .The communication between controllers and interference are designed accurately done. Monitoring System is done to meet all the requirement and specification as mentioned in the objective. An embedded application is created using Python andR Programming.The predict results of the monitor model proposed are shown in table below.

Table 2

Temperature	25	>35	>40
Relative Moisture	44	60	75
Co_2Concentration(1000ppm)	<50	>110	>130
Status	Good	Critical	Risk/Danger

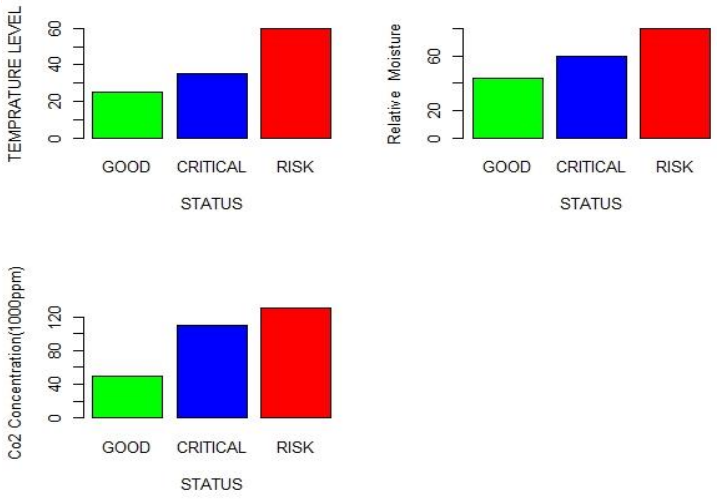

Fig6: Warehouse Status based on the Various Factors

VI. CONCLUSION

In this Paper Monitoring system is designed for monitor and controlling of the Food granulelosses based on the various temperature level conditions. The grain system design is done to meet all the requirement and specification as mentioned in the objective. It is shown from the

design implemented in the current work provides flexibility, scalability, portability and security/integrity of the data transmission over long networks with lower power consumption.

There are certain aspects in this work that can be investigated in future design should GPRS network is used to transferring data to all the warehouses. That will help to getting centralized data at one location and able monitor by authority to take necessary measure to reduce as much as possible.

There are certain aspects in this work that can be investigated in future, such as Environmental factors influencing the Grain quality, we are considered only major parameters Temperature, Humidity and Carbon Dioxide concentration for early detection of deterioration of Food Grains and Good Control actions like Reducing Temperature in the Grain depot if Temperature is High i.e. keeping parameters at nominal level by an Automatic system irrespective of condition.

REFERENCES

[1] Deepak Kumar AndPrasantaKalita. Reducing Postharvest Losses during Storage of Grain Crops to Strengthen Food Security in Developing Countries

[2] http://www.fao.org/docrep/t0522e/T0522E04.htm

[3] Xiaodong Zhang, Xiujuan Li, Jie Zhang (2010). Design and implementation of embedded monitoring system for grain storage: IEEE Conference.

[4] Ch.Chandra Sekhar, et.allBig Data Analytics on Indian Crop Planning to Increase Agricultural Production, ASTL -Research on Smart Technologies in Data Science and Communications.

[5] Ch Sudhakar,et..allAn IoT Application-Weather Reporting System, ASTL -Research on Smart Technologies in Data Science and Communications. Vol.147

[6] Maier, Channaiah, Martinez-Kawas, (2010).Monitoring carbon dioxide concentration for early detection of spoilage in stored grain: Department of Grain Science and Industry, Manhattan, Kansas