Food wastage control in CWC and SWC (Central Warehouse Corporation & State Warehouse Corporation)

S.Swaathi[1], T.Akilandeswari[1], T.Subha[2]

1. UG Scholar, IT Department, Sri Sairam engineering college , Chennai
2. Associate Professor, , IT Department, Sri Sairam engineering college , Chennai.

Abstract— maintaining the quality of food grain plays an essential role in the control of food wastage. Monitoring and predicting the quality of food grains through man power has become quite difficult. But, with the help of certain devices it becomes easy. In this system, DHT11 sensor is connected to the NodeMCU to sense the temperature and humidity of warehouse where the grains are stored. The temperature and humidity of the warehouse are sensed respectively and if it exceeds the threshold value that is needed for retaining the quality of the grain, sensor immediately sends the signal to Node MCU. Node MCU takes the appropriate counter measure for maintaining the threshold value of temperature and humidity. The values detected by the sensors are also transmitted to cloud through Wi-Fi module present in Node MCU.

Index Terms— counter measure, humidity, maintain, monitor, quality, sensor, temperature.

I. INTRODUCTION:

Grains are the most vital chief sustenance in generally nation. Grain stockpiling is an imperative segment in the economy and the general public. Keeping up quality and security of grain stockpiling are identified with the huge number of individuals in India. Grain stockpiling in this way possesses a fundamental put in the economies of created and creating nations. The motivation behind any grain storeroom is to provide safe stockpiling conditions for the grain keeping in mind the end goal to forestall grain misfortune caused by unfavorable climate, dampness, winged animals, bugs and small-scale life forms like growths. By observing and controlling grain stockpiling more applicable continuous data can be gotten. What's more, in the wake of breaking down the information of rice, millet, wheat under various pressure conditions, consolidating this result with temperature. The measure of wastage can be viably lessened with the assistance of sensors and different gadgets. This framework proposes headway in the regular alignment strategy that is utilized. Sensor DTH11 are appropriate to satisfy such needs. The task at last goes for chopping down the costs included when the whole framework is physically worked and regulated. This is puts stock in compelling observing without anyone's essence. Ease microwave sensors for process observing and control that will bring about critical work and cost funds not withstanding keeping up the coveted quality. The advancement in technology allows us to develop real-time monitoring system of remote locations, which makes it easier to control and monitor conditions from any place at any time. The Real-time monitoring of the grain storage system is designed based on ARDUINO, which helps us to improve the level of grains storage and reduce the grain losses during storage procedure and also reduce manpower and labor intensity. The environmental factors like temperature, moisture content, humidity, and light greatly influence the storage of food grains. Wireless sensor networks play a significant role in monitoring and control of remote applications like grain storage silos. Here, an integrated system has been proposed to remotely monitor and control the temperature, moisture content, humidity and light of different food products viz. grains, wheat etc. Technology has been used to collect environmental data from different sensor nodes inside the storage bins and monitored using the Wi-Fi module present in Node MCU.

II. EXISTING METHODOLOGY:

- **GRAIN CROP DRYING, HANDLING AND STORAGE :**

In existing methodology, there is no device to monitor the crops, only the authorities in the warehouse will monitor the crops manually. The authority in charge will take care of the crops inside the warehouse by checking for its condition from time to time. They must ensure that the bulk amount of crops are properly dried, properly placed in a sack and also properly stacked and maintained. All these appears to be quite easy but is indeed a difficult task since the amount of crops to be stored in the warehouse is quite large in number.

- **GRAIN DRYING :**

Grain drying is an essential factor for good grain quality, since improper drying may lead to growth of fungus which in turn results in damage. Since only the respected authority in the warehouse will take care of the crops, he/she should manually first check for the condition of the crops, before stacking them up and storing. If the crops needs drying then the crops are placed in a dry/hot place, with or without

uncovering the sack. This is done periodically even after the proper storage of the crops in the warehouse. It is done in order to ensure that the quality of grains remains good all the time without any damage.

III. PROPOSED METHODLOGY:

- The system is based on embedded Arduino. The environment information such as humidity and temperature data about the grain is collected and stored by Multi-sensor.
- If the humidity and temperature sensor value is increasing the further action can be done by Arduino. If the inner room temperature is low or not equal, Arduino will automatically generate the signal to glow the incandescent bulb. When the temperature is normal automatically the bulb is switched off.
- Fan will rotate automatically if the humidity level of the environment is high. At the same time notification will ne send to the corresponding in charge through wi-fi.
- To produce the echo signal to stop the reproduction for animals (like cat, rat, etc.) and lizard, Ultrasonic sensors are used.

- Storage is automatically monitored by the sensors. One can easily control the grain health condition using Mobile. Medical tablets are not used.
- To provide aeration inside the bin to maintain the environmental conditions within limits thus ensuring food security, an automated aeration control strategy is used.

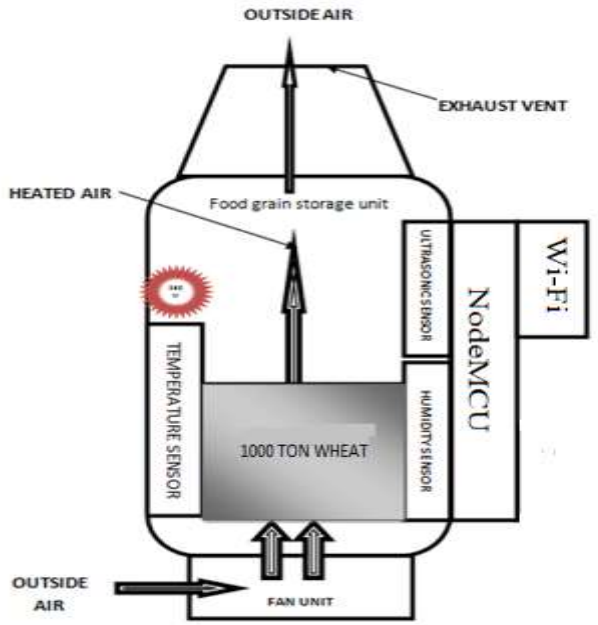
To develop an integrated system where the monitoring and control of different food products viz., rice, wheat, rava and maida is done to prevent food storage losses and to ensure food security is the objective of proposed system.

IV. SYSTEM ARCHITECTURE:

The working of this implementation is carried out as a combination of two modules. The first module involves with the appropriate measurements of various dimensions of crops and counter measures for those to get away from grain damage. The second module involves with the analysis part, which helps the person in authority to take appropriate decision upon the disposal of crops from the warehouse at the appropriate time.

MODULE 1:

The sensors connected to the NodeMCU senses the value from the grains stored in the warehouse. It measures the temperature, humidity of the warehouse (here wheat is taken in consideration) and once it finds it exceeds the limited temperature and humidity for normal maintenance of grain, the counter measures are taken. If the temperature is hot, then to cool the environment, AC fan is switched on and if the temperature is over cool, then to bring down to the threshold value for normal maintenance of grain, incandescent bulb is switched on. Further the ultrasonic sensor sends signal of varying frequency, which causes disturbance to insects and hence keeps them away from the warehouse.



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NodeMCU: It is a microcontroller that to which the sensors DHT11 and ultrasonic HC-SR04 are connected. It also has Wi-Fi module in it, with which the values sensed by sensors are sent through.

Temperature and humidity sensor: For sensing temperature and humidity, DHT11 is used.

Ultrasonic Sensor: This sends varying frequency by which the disturbance is caused to rats and hence prohibits them from entering warehouse.

Fan Unit: It consists of AC fan of 250w to cool the environment when temperature is hot

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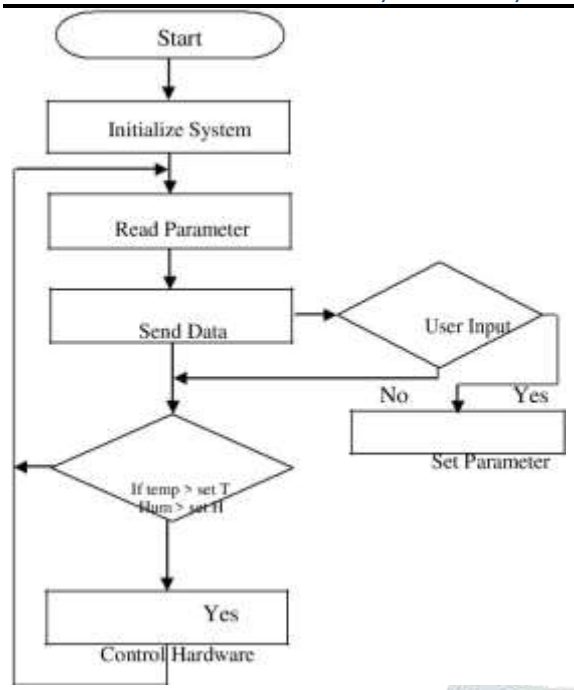
Heated Air: To supply this heat air to environment, incandescent bulb of 200w is used.

MODULE 2:

The values observed by the sensors are sent continuously to the corresponding authority through the Wi-Fi module present in the warehouse. These values are stored in the website Thing Speak where, with the previous values and the present values obtained, the conditions are set. When the threshold value occurs, it indicates or suggests that the grains must be disposed off from the warehouse.



V IMPLEMENTATION:

. Here we use NODE MCU for notifying the warehouse admin about the environmental information such as temperature and humidity data of the warehouse .The temperature and humidity data of the warehouse is detected by the DHT sensors attached to the NODE MCU and the values are transmitted to the cloud and the admin of the warehouse get the notification through the Wi-Fi attached to the NODE MCU .if the temperature is below a certain threshold level and if the humidity is high above the threshold value the incandescent bulb glows and if the temperature is high and the humidity is low the fan rotates automatically. This is to keep the grain's moisture content correctly to maintain the quality of the grain. In addition, in module, two we have an analyses part all the recorded values are stored in excel and all these values are analyzed and the result will be send to the admin of the warehouse as a notification.

VI RESULT:

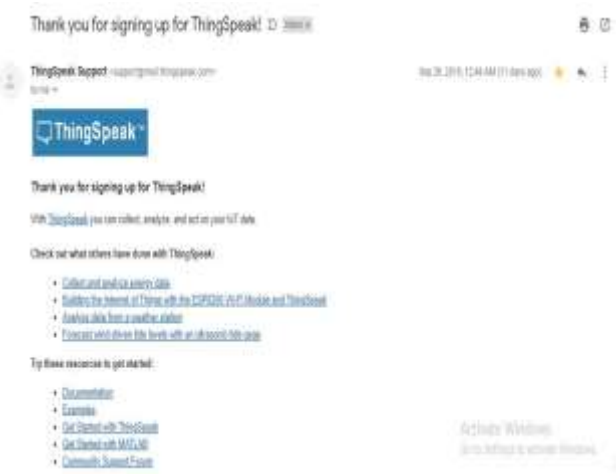


Figure 1: Thing speak for Energy Monitoring

Figure 2: Data Collection

Figure 3: signing

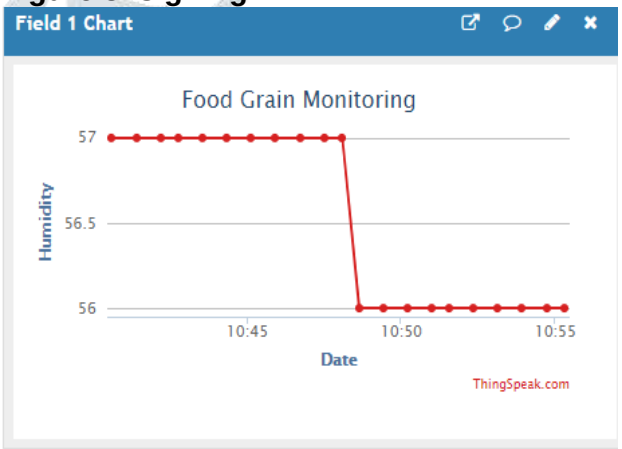


Figure 4:Humidity

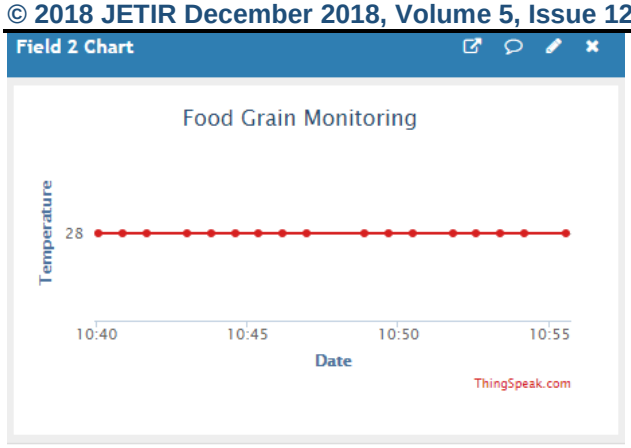


Figure 5: Temperature

VII CONCLUSION:

TEST 1	Grain initial humidity content % 54	Grain Temperature (0C) 26	Test conducted on good quality of grain
TEST 2	Grain initial humidity content % 77	Grain Temperature (0C) 38	Test conducted on decomposed quality of grain

In this paper we have discussed about the Realtime controlling and monitoring of food grains using NODE MCU. This Realtime monitoring system overcomes the drawback of traditional monitoring and controlling of food grain wastage. This gives us the flexibility and reliability to access the environmental information about grain and also helps us to provide the notification to the respective in-charge of the warehouse .This Realtime monitoring system helps us to control the grain loss and also maintains the quality of the grain.

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