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Upgradation of Food Moisture Analyzer using IOT

Nafisa Mapari[1*], Salman Siddiqui[2], Rumi Shaikh[3], Rishabh Srivastav[4]

[1,2,3,4]Department of Computer Engineering, M.H Saboo Siddik College of Engineering, Byculla, India

[*]*Corresponding Author: elnamlass@gmail.com, Tel.: +91-76780-13834*

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Abstract— Moisture meters are used to measure the percentage of water in a given substance. This information can be used to determine if the material is ready for use, unexpectedly wet or dry, or in need of further inspection. Food plays a very vital role in our life so it is very important to check the food quality using moisture meter .Moisture plays a very vital role in the daily operations of Food Corporation of India (FCI). With a change in moisture value, computation of storage loss/ gain in food grains gets affected. Hence capturing the moisture value is very essential. Since many food products are bought and sold by weight, moisture content is a key component in ensuring accuracy for purchasing raw materials. Water in food products also affects various characteristics of the product that are important to its taste, texture, color, density, particle size, etc. Generally, moisture is calculated and reading are noted manually and then it is fed in the system then deploy it online. So, the proposed system gives a solution where the readings of the moisture meter are captured and directly fed into Depot Online System (DOS) using wireless transmission. It will reduce the human labor as well reading will be precise as compared traditional system.

Keywords— IOT, Moisture Meter, FCI, DOS

I. INTRODUCTION

Moisture content analysis is a critical component of material quality and an essentially function of quality control in most production and laboratory facilities, from biological research organization, pharmaceutical manufacturers to food producers and packer, moisture content control greatly influences the physical properties and product quality of nearly all substances and materials at all stages of processing and final product existence.

Currently, many moisture analysis methods are available for commercial purposes. The primary method of water content determination include, spectroscopic, chemical, conductively and thermo gravimetric analysis and the use of halogen heating as the source of thermal radiation[3,4]. By using these method many Food Moisture Meters are implemented. The readings of the moisture meter are noted manually and are fed into DOS (Depot Online System). Since there is a human intervention, there could be chances that the readings noted are erroneous. Considering this problem the following paper proposes the automation of Food moisture Analyzer by sending readings to the server without human intervention.

II. RELATED WORK

According to previous research work there is a lack of good automation system in measuring the moisture content in the field of farming as well as food industry. The reading of the system is mostly taken manually by employees. Due to this moisture reading become erroneous and time consuming. Food Industry uses moisture meter, a hardware device developed by different manufacturers. The readings of the moisture meter are noted manually and are fed into Depot Online System. Since there is a human intervention, there could be chances that the readings noted are erroneous. To overcome this problem the proposed system came up for better quality of food and soil.

A manual method for measuring the moisture content of grain was presented based on single chip microcomputer and capacitive sensor[1]. A new type of capacitive grain moisture on line measuring device was designed based on the measuring principle of non-contact parallel plate floating capacitor, which was suitable to continuous dryer under severe environment[2]. The power level of the microwaves is similar to that of Wi-Fi. Therefore, the sample is unharmed and no heating occurs[3]. Results of bulk density and moisture content prediction from complex permittivity measurement with a low-cost microwave sensor are reported here for wheat and soybeans[4]. In [5] author adopts JZ873 wireless transparent transmission module to realize the wireless data communication among various modules, and to formulate the communication drive. An online resistance grain moisture detector is designed, based on the model of the relationship

between measurement frequency and grain moisture and the nonlinear correction method of temperature[6].

With high dust environment and lower detection precision due to grain moisture fluctuation, the biggest problem of medium method is the measurement of sub-scattering properties of hydrogen instability. The changes of the relationship between the neutron count ratio and the volume of grain moisture content of food varies by species [7,8].

III. METHODOLOGY

The Block diagram of the Proposed System is shown in the figure 1.

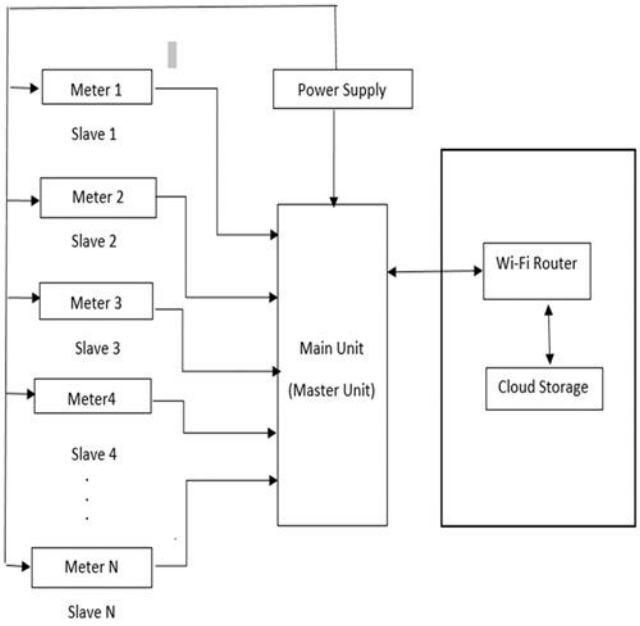

Figure 1. Block Diagram of Proposed System

The block diagram consists of N slave devices and one master device. The dependencies are also shown there. All devices are connected to root node called as master and this master is responsible for all data communication between server and moisture meter. This will reduce the overhead of each slave since slave is not worried about data transmission. The master is also used to check the errors in the slave devices. Master slave approach will also reduce the number of terminals directly connected to the server. This allows user to take real time with more accuracy. The approach is complete end to end solution for the existing manual system and will address the issue with low cost. The cost of system manufacturing can reduce for bulk quantity.

There will be a master device and a slave device connected to each other using wireless communication like Wi-Fi. The master will gather all the moisture data from the slave device. Establish a connection with online server and send all the data's to the server. To perform this action the master device is fully depended on Wi-Fi connection. This approach will help to measure moisture of multiple locations within the building and send the data to the master device which is also an electronic controller. It can be used monitor the real time data online and take action accordingly.

Moisture meter

1. RS 232 to UART converter

2. NODE MCU: Node MCU is an open source IoT platform.

3. DHT 22: The DHT22 is a basic, low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed).

4. EPS-01

Figure 2. Devices Used

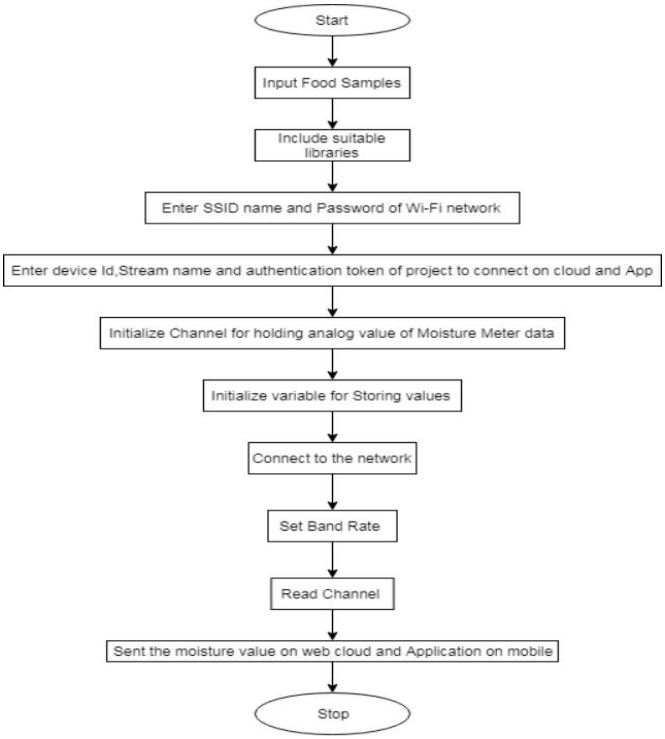

Figure 3. Flowchart of Proposed System

Hardware Requirements:

- Processor Speed (i.e. Intel Pentium 4, 3.2 GHz or Power PC G5, 2.0 GHz)
- Memory RAM (512 MB) and above
- Graphics Card (i.e. ATI Radeon 9800 w/ 256 MB video memory)
- Hard Disk Space (i.e. 20 GB and above)
- I/O Ports (i.e. USB, Firewire, Serial, Parallel, SCSI, VGA, DVI ports)

RESULTS AND DISCUSSION

Improvement made by the proposed system:

- Decrease the overall time required for computation.
- Increase productivity, availability, reliability, and performance.
- Decrease the overall Effort required for computations.
- To remove error due to human intervention.
- Ease of Data Transfer.
-

IV. CONCLUSION AND FUTURE SCOPE

Future Scope

This proposed system has a great scope for improvement and extension. It can be made calculate the moisture soil, wood etc. Using Android app can also be made so that admin can access from their mobile phones also. The portal can be more efficient so that more number of employees can work simultaneously. The proposed system can be made on API, so that proposed system should never face problem in future while integrating with other moisture meter. The portal can be integrated with any moisture meter and deploy the reading to server.

Conclusion

With this approach proposed system can replace manual reading process with fully functional automated IOT based solution. The proposed an automation approach to analyse the moisture content of the food and then deploy it online. To reduce the human effort and increase and efficiency of workers. By automation correctness of reading will also be more precise. The proposed system with necessary improvements discussed holds the commercial viability. It is economical, low cost and reliable system which is easily accessible. It will make the work easier and reduces the error in reading.

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Authors Profile

Mrs. Nafisa Majid Mapari. Works as an Assistant Professor at M.H. Saboo Siddik College of Engineering in Computer Engineering Department.
Qualifications: - B. E. (IT) M.E. (IT), Also, having a teaching experience of more than 10 years in this institute.

Mr. Salman Siddiqui. Currently pursuing Computer Engineering from M.H. Saboo Siddik College of Engineering and belongs to Computer Engineering Department.

Mr. Rumi Shaikh. Currently pursuing Computer Engineering from M.H. Saboo Siddik College of Engineering and belongs to Computer Engineering Department.

Mr. Rishabh Srivastav Currently pursuing Computer Engineering from M.H. Saboo Siddik College of Engineering and belongs to Computer Engineering Department.

