REVIEW PAPER ON ESTIMATION OF DURABILITY OF RICE CROPS USING SENSORS

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ABSTRACT

Rice is one of the leading food crops in the world. It is one of the most important staple food crop of India for more than 2/3rd of its population. They directly supply more than 25% of calories consumed by the entire human population. Nearly 150 ha is the area harvested for rice crops. Rice is one of the world's largest cereal crops providing the caloric need for millions of people. Human consumption sums up to 85% of total production for rice compared with other leading food crops.

Since, the rice after farming are packed in huge sacks and stored in go-downs for months. It becomes very difficult to deal with the quality of the rice grains. During storage, a number of physicochemical and physiological changes occur, which are collectively termed aging, which affect the rice quality.

INTRODUCTION

Agriculture is the backbone of our country and economy, which accounts for almost 30 % of GDP and employs 70% of the population. Agriculture technology available in the 1940s could not be able to meet the demand of food for today's population, in spite of the green revolution. Similarly, it is very difficult to assume that food requirement for population of 2020 will be supplied by the technology of today. Grain moisture is one of the important factor.

The Farmers not only face many constraints to producing staple crops, but they also face many grain management challenges after harvest. By not being able to store effectively, most farmers cannot take advantage of price increases that occur during the production cycle. They often shift from sellers to buyers of grain during the storage season and therefore weaken their food security.

In addition, when effective storage technology is not available, traditional storage technologies often unable to dry and store grain properly can even lead to increased losses during storage Unfortunately, farmers are limited in strategies to cope with storage losses because of credit constraints , risk aversion, lack of modern storage technology and unreliable information about grain prices. As a result, many farmers sell immediately after harvest in order to mitigate pest loss. Therefore, they forget potential profits that they would have earned had they held stocks at harvest and sold later in the marketing year when prices are typically much higher.

RELATED WORK

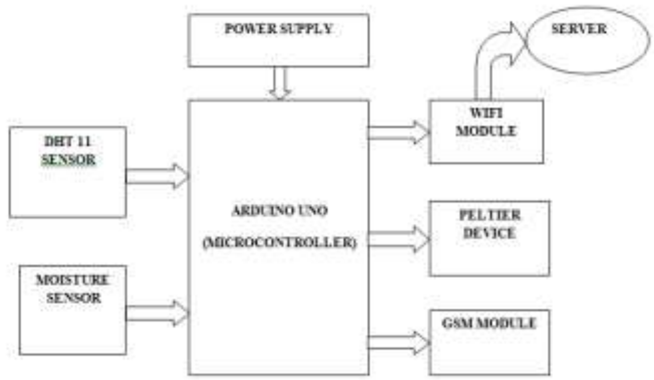

Fig : Block Diagram

In this paper, there is a peltier device which is used to get the input environmental conditions by sensors like DHT11 and moisture sensor via arduino uno microcontroller. Then the peltier device based on the prior required conditions which is set by arduino code, checks the environmental conditions on real time and automatically actuates i.e either it acts as a cooler or the heat sink for the warehouse where the condition has to be monitored.

In this paper, a real time agro-storage system is designed using arduino uno microcontroller and also with some sensors like moisture sensor, DHT11 sensor. The temperature, moisture, humidity values are displayed using an 16X2 LED display. Along with the peltier environment monitoring the system also consists of the GSM module for sending the alert messages to the farmers. If the present temperature is to hot for the grain to sustain and harmful for their durability and quality, the aurdino uno checks for the condition mentioned in the code and automatically on real time basis on the peltier cooling device and simultaneously sends the message to the farmer about the unfavourable environment condition and the on an off of the peltier device. Similarly it works for cold weather where the peltier heating device gets on.

LITERATURE SURVEY

Zhang [1] has developed a temperature and humidity monitoring system based on ZigBee technology with ZigBee network with measurement cables and ZigBee node with sensors. Some simulations are conducted to analyze the performance of proposed network architecture. The results based on the performance metrics of node density, packet delivery ratio and the average end-to-end delay influences are discussed. In general, the network performance is very much affected by the node density in the barn. An ideal node density model has to be determined considering the operational area in barns in the future.

Xiaodong et al [2] has discussed the design and implementation of an embedded monitoring system based on ARM microprocessor for grain storage. The proposed architecture and results demonstrate the feasibility of using Ethernet or GPRS networks to communicate effectively with lower computer terminal with respect to system functions such as grain situation monitoring and control. The embedded solution scheme and ARM technology being introduced in this paper make the monitoring system for grain storage easy to realize in practice, and ensure the system has higher performance compared with the traditional monitoring systems. The system was tested using an industrial model machine in the laboratory and had a very satisfactory performance.

A.K. Rai et al [3] suggest how the moisture content of stored grain can be measured**.** Microprocessor based grain moisture measurement system has been developed. The developed system has important features such as automatic temperature compensation, calibration facility at user level, facility to store the measured moisture content of the sample for future use, and facility to provide temperature of the commodity. Since the sensor of the system is based on capacitance method and grain is acting as dielectric medium of the sensor, temperature variations in grain introduce minor error in meter reading. A meter without density correction may affect the accuracy of measurement slightly. However, the developed instrument is working satisfactorily for all practical purposes in the range of 5% to 25% of grain moisture with an accuracy ± 0.5%.

Reddy et al [4] has implemented the idea of a safe storage facility of rice grains in sacks. The humidity Sensors and temperature sensor used are cost effective and can be used by farmers. The performance of the humidity sensor has a significant effect on the accuracy of moisture determination. In this way , the huge losses to the farmers are averted. The GSM Mobile technology plays an important role by updating the user about the process, so that they will be aware whether there are any microbial growth and what the next step of action to take is. The mobile application also provides what are the remedy measures that can be taken after analyzing the values.

Thenmozhi et al [5] has suggested an idea to quantify the yield gap in various districts of Karnataka. It is found that among 27 districts considered only 8 districts are performing as expected. All other districts suffer from poor production rate. It is ideal time to realize the second green revolution to increase the food production to keep pace with the increase in population. The gradual decrease in agricultural produce results in failure of food security and economic degradation. This is the first step towards predicting the yield gap in future years.

Eigenberg et al [6] suggests the environmental monitoring system of humidity and temperature, which was developed and tested that allowed temperature and humidifies to be monitored in harsh environments. Six temperature and humidity measurement systems were constructed to provide continuous monitoring of environmental chamber thermal conditions. After seven months in use, the temperature units provided accuracies within the manufacturers specifications for the temperature sensor devices (±0.5°C accuracy at 25°C). The AH measurement systems were calibrated using a saturated salt solution. Short–term (one week) stability tests indicate the units have good accuracy (offset of –0.038 g/m3 at 17.6 g/m3 and 0.342 g/m3 at 2.6 g/m3). The overall performance of the temperature and humidity system was acceptable for thermal environment monitoring applications.

Mahajan et al [7] said that quality analysis of rice grain using digital image processing, In food handling industry, grading of granular food materials is the biggest issue because samples of material are subjected to adulteration. This paper attempted to highlight the basic problems of rice industry to analyse the quality of rice grains and also highlighted the related work of researchers to eradicate the problem related to quality analysis of rice grains.

Ren et al [8] presented the grain storage monitoring system based on WSN which can overcome flaws of traditional wired system and short comings of other wireless methods. Spot test indicates fine stability in work, strong anti-jamming, avoiding lightning, lower power consumption, two 1.5 V batteries can supply 5 years, strong expansibility, the increase of proper nodes can realise monitoring humility, pest density and other targets.

Singh et al [9] has developed a new concept for grain storage in india With every bite you and I throw away, someone, somewhere in the world goes hungry. A report by the Institution of Mechanical Engineers on global food wastage states that 50 percent of all food produced around the world never reaches a human mouth. When a country like India is on its way to become a superpower and its reports say that this year's production leaves the government with 75 million ton of grain on its hands but with amenities to store only 63 million ton in the state run warehouses, millions of tons of crops could be left out in the open, exposed to rain and rodents, or stored in open spaces with only waterproof sheets to cover them. Over last decade the grain production has increased, but at present, numbers of warehouses are not sufficient to manage this increase. This paper presents an innovative idea of nano warehouse which can solve countries grain storage problem.

Funk et al [10] in his paper proposed the Unified Grain Moisture Algorithm based on measurements of the real part of the complex permittivity of grain at 149 MHz The main goal of the method was to enable different moisture meter models to provide equivalent moisture predictions without calibration development. The database that was used to create and test the method included 6189 grain samples representing 53 grain types of US grain that were collected over a period of 6 years. The overall standard deviation of differences with respect to the air-oven method was 0.34% moisture. Three temperature correction functions with differing levels of complexity were evaluated. The algorithm is available as a public algorithm for commercialization by multiple manufacturers.

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