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A Real Time Monitoring and Controlling Agricultural Products with Aurdino Sensor

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Abstract— *The main objective of this paper is to develop the monitoring system in agricultural products such as food grain. This system is substitute to traditional farming method in which farmer had to visit the field regularly. We will develop a system that will help the farmer. We can see the status of storage grain anywhere without visiting storage area. This paper investigates a monitoring system using aurdino which senses temperature, humidity, ultrasonic sensor for frightening rats, and insect etc. And a toggle switch for hidden door purpose to oppose the unauthenticated person to enter into the storage area.*

Keywords— Agricultural Monitoring, Humidity sensor, Temperature sensor, ultrasonic sensor, aurdino, Ethernet shield.

I. INTRODUCTION

Accurate determination of moisture in food grain is important because the moisture contents directly affect the product which is stored. It changes drying-I time, preservation period, shelf life, tastes and methods of material handling. Also marketing and import/export regulations of most agricultural products, such as dried fruits, require accurate! Moisture measurements. In the market area, there is no universally applicable moisture which can lead to reliable and quick moisture measurements of dried fruit products .Most of the methods which is available use are destructive methods which require transformation for samples into different forms such as powdering, crushing etc.

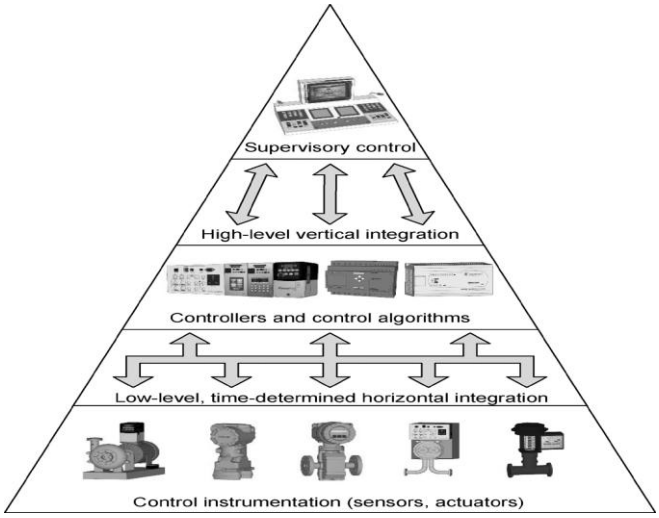
As a result this process makes changes in the inherent material properties by altering the form of existence of water molecules within the sample leading to inaccurate readings. Microwave absorption techniques have been used in the measurement of moisture of non agricultural products eg. Cloth, coal, etc. And agricultural products such as grains, corn .At present, the main features of China's biggest food grain monitoring and control system is limited to simple temperature and humidity testing and grain situation analysis, without any proper means of processing . As a account basic means of ventilation, drying and circulation fumigation are relatively backward, and waste a lot of time manpower and resources. In an account, the sampling information transmission distance is far away and the hardware connections are complex, which result low system accuracy, and poor reliability peripheral device. This not only brings great damage to the grain storage management, but also brings the hidden security risks. An intelligent system for monitoring and controlling of the grain condition is designed in this paper. The system is based on embedded Arduino core processor, using Ethernet shield for the lower machine control unit.

II. OVERVIEW

The first dielectric-based density-independent moisture calibration function was defined in the early eighties based on observations by Kraszewski. More recently, method for simultaneous and independent determination of bulk density and moisture content from measurement of the dielectric properties at a single microwave frequency was proposed. With this method, the bulk density is determined independent of moisture content and temperature, and moisture

Content is determined independent of bulk density. Single moisture calibration equation can be used to determine moisture content in materials presenting and compositional differences. As in all indirect methods, the first step is to identify correlations between the measured dielectric properties and target parameters, which are determined from measurements with prescribed standard methods. On a wet basis with the oven-drying Technique, and bulk density is determined gravimetrically by taking the ratio between the mass of the sample and its volume. Once these analytical expressions are established, moisture and density calibration equations in terms of dielectric properties are obtained and embedded in the sensor measurement algorithm. A three-dimensional representation of the variables, described in the next section, permitted the determination of moisture content with

temperature compensation. Bulk density was also determined from the dielectric properties independent of moisture content and temperature. In this paper, dielectric-based methods and sensors for real timed extermination of bulk density and moisture content of grain, seed, and in-shell peanut kernels are presented for both static and dynamic situations. Also, use of the same sensor configuration is shown for a variety of applications, including a flowing grain system, bench top microwave moisture meter for in-shell peanuts, and a sensing unit for monitoring and controlling the peanut drying process, which ultimately minimizes the cost and provides another incentive for wide spread use of microwave sensing technology.



III. USAGE OF MORDERN INSTRUMENTS IN FOOD STORAGE

Microwave moisture meter and sample holder filled with peanut pods. A Real-time Monitoring and Controlling System for Grain Storage with ZigBee Sensor Network. The purpose of this study is to develop and test a real-time monitoring and controlling system for grain storage. Because ZigBee/IEEE802.15.4 indicates a network system which is highly reliable, cost-effective, low power consumption, programmable and fast establishing, The ZigBee standard defines the network layer specification to allow the building three type network topologies: star, tree and mech. ZigBee also defines the typeof device: the Full-Function Device (FFD)and the Reduced-Function Device (RFD).

IV. COMPONENTS

4.1 Arduino

An Arduino is actually a microcontroller based kit which can be either used directly by purchasing from the vendor or can be made at home using the components, owing to its open source hardware feature. It is basically used in communications and in controlling or operating many devices. It was founded by Massimo Banzi and David Cuartielles in 2005.The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward.

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4.1.1 Ardino pin configuration

Arduino Uno consists of 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button

4.1.2 Power Jack

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging

4.1.3 Digital input

It consists of 14 digital inputs/output pins. Some of them have special functions like pins 0 and 1, which act as Rx and Tx respectively , for serial communication, pins 2 and 3-which are external interrupts, pins 3,5,6,9,11 which provides pwm output and pin 13 where LED is connected.

4.1.4 Analog input

It has 6 analog input/output pins, each providing a resolution of 10 bits.

4.2 Ultra Sonic Sensor

Ultrasonic sensors work on a principle similar to sonar which evaluates distance of a target by interpreting the echoes from ultrasonic sound waves. This ultrasonic module measures the distance accurately which provides 0cm - 400cm with a gross error of 3 cm.

MALE CONNECTOR SIDE

Pin No.	Signal
1	VCC (5V supply)
2	Trigger Pulse Input
3	Echo Pulse Output
4	GND (0V)

4.3 Humidity Sensor

A humidity sensor is a device that measures the relative humidity of in a given area. A humidity sensor can be used in both indoors and outdoor

PIN DESCRIPTION

Pin	Name	Details
1	GND	Power Supply Ground
2	+5V	Power supply Positive input
3	OUT	Active Low to high

4.4 Humidity output

- 0.9V → low humidity output voltage and range 30%RH.
- 3.4V → high humidity output voltage and range 90%RH

4.5 Temperature Sensor

Temperature is the most-measured process variable in industrial automation. Most commonly, a temperature sensor is used to convert temperature value to an electrical value. Temperature Sensors are the key to read temperatures correctly and to control temperature in industrials applications.

4.6 Ethernet Shield

The Arduino Ethernet Shield R3 (assembled) allows an Arduino board to connect to the internet. It is based on the Wiz net W5100 Ethernet chip (datasheet). The Wiz net W5100 provides a network (IP) stack capable of both TCP and UDP. It supports up to four simultaneous socket connections. Use the Ethernet library to write sketches which connect to the internet using the shield. Ad fruit started shipping the R3 version on Feb. 3, 2012 at 3:30pm ET. The Arduino Ethernet Shield connects your Arduino to the internet in mere minutes. Just plug this module onto your Arduino board, connect it to your network with an RJ45 cable (not included) and follow a few simple instructions to start controlling your world through the internet. As always with Arduino, every element of the platform – hardware, software and documentation – is freely available and open-source.

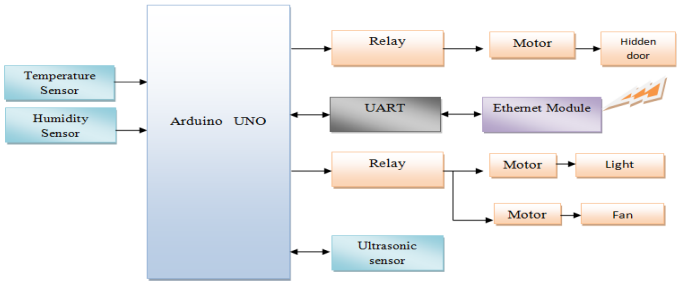

FIG.1. BLOCK DIAGRAM

V. WORKING

Grain information such as temperature, moisture content etc. is collected my multi-sensor and sent to the owner through internet. If moisture content present in the grain extends beyond a certain limit bulb will be automatically activate to prevent grain damage by bringing back to normal condition. Likewise if temperature extends beyond certain limit fan will be automatically activated to bring back to normal condition. Toggle switch will be activating after working hours and used for security purposes. If any thief enter into storage room for robbery hidden door will be automatically activate and a hidden door will be closed so that thief cannot escape from the storage room and the owner will get the information through internet. Ultra-sonic sensors are produced to scare the animals like rats, cats, and lizard and it will stop the reproduction of animals. The grain information will be refreshed for every two seconds.

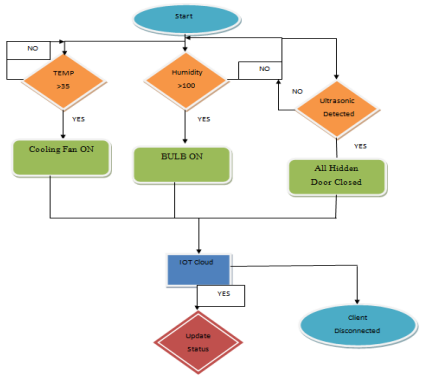

FIG.2 FLOW CHART

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FIG.3 . HARDWARE SETUP

VI. CONCLUSION

- Medical tablets are not required to stop the reproduction of animals.
- Storage of grains is monitored periodically and information get collected using sensor and sent to the owner through iot
- Control the grain health condition.
- It is a cost effective.

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