Storage Monitoring for FOOD GRAIN Processing Industry using Embedded System

G. Prabhakaran[1], C. Kiruthikalakshimi[2], S. Mithila[3], C. Subhananthi[4], T. Subramini[5],
[1]Assistant professor, [2345]UG Students
Department of electronic and communication, Nandha Engineering College, Erode-52,
Tamil Nadu, India.

Abstract **- Grain stockpiling possesses an imperative part in the economies of created and creating nations. Legitimate checking of grain stockpiling is basic to decrease grain misfortune. The present framework includes human exertion in the majority of the exercises which lessens work proficiency and builds time utilization. These challenges can be kept away from by our proposed venture. In this venture, the controlling and observing of the grain stockpiling territory is completely controlled by ultrasonic sensor. To recognize and control the bugs, rats utilizing ultrasound method. The levels of the grain condition are anticipated in view of the sensor arrange. The undertaking concentrated on the equipment circuit outline of the grain condition astute checking framework.**

Index words – Ultrasonic sensor, Storage monitoring, Food grain.

I. INTRODUCTION

Rice is the staple nourishment for 65% of the populace in India. India is the second biggest maker of rice on the planet by china. In India paddy involves the primary spot both in region and generation, the India's rice creation came to a record high of 104.32 million tons in 2011-2012 product year. It is on a very basic level kharif trim in India. It request of around 25 degree Celsius or more precipitation of more than 100cm. Rice development on the assortment of soil like openings, top soils, and rock. It can endure soluble and in addition corrosive soils. In any case, clayey soil is well suiting to the raising of this product. In a portion of the states like west Bengal, Assam, Orissa and Bihar, two products of rice are brought up in the year. This gives us abundant open door for advancement of rice based esteem included items for procuring more remote trade. Aside from rice processing handling of rice grain for oil extraction is additionally a critical agro preparing action for esteem option, pay and business age. A considerable lot of the rice handling are the conventional huller write and are wasteful. Present day rice factories are having high limit and are capital escalated, albeit productive. Little present day rice plants have been produced and are accessible in the market however the absence of data is a bottleneck in its selection by the imminent business visionary. The present model will be go far in crossing over the data hole.

We experience a daily reality such that everything can be controlled and worked consequently, yet there are as yet couple of essential parts in our nation where robotization has not been embraced or not been put to an undeniable utilize, maybe on account of a few reasons one such reason is taken a toll. Agribusiness has been one of the essential occupations of man since early developments and even today manual mediations in cultivating and putting away grains are inescapable. In many nations grains are among the most essential staple sustenance. Be that as it may they are created on a regular premise, and in numerous spots there is just a single reap a year, which itself might be liable to disappointment. This implies with a specific end goal to encourage the total populace, the majority of the worldwide generation of maize, wheat, rice and millet must be held away for periods fluctuating from one month up to over a year [3]. Grain stockpiling subsequently involves an indispensable place in the economies of created and creating nations alike.

India is one of the biggest grain makers on the planet. It produces 200 million MT (Metric tons) of wheat and rice every year. Seventy-five percent of aggregate grain misfortune happens at the ranch level. The lion's share of ranch level misfortunes are driven by deficient capacity (22%), drying of harvests (15%), transportation (12%), and sifting (10%) while whatever remains of the misfortune disperses among a few exercises.

This paper consists of 8 sections. Section II describes Existing method of storage food grains monitoring. Section III explains proposed system and section IV describes related work of monitoring system and section V shows the parts description. Section VI tells working principle and section VII describes results obtained, section VIII concludes the paper.

II. EXISTING SYSTEM

The sensor enables information to be sent to a remote area utilizing GSM modem associated with the controller. The sensor frameworks have effectively assembled information from an assortment of sensors including temperature, mugginess, CO2 and fire sensors. The information and yield capacities status will be shown on LCD. Any anomalous condition detected by any of the sensor will be comprehended by our controller and after that it will send a SMS promptly to approved portable number. With the goal that the proprietor can take fundamental measures quickly. In this current technique having time delay of receiving the output signals.

III. PROPOSED SYSTEM

In this method, we employed microcontroller based grain storage monitoring by which it measuring level food grain stored in that container. In which an ultrasonic sensor is used to monitoring the storage level. The measured value is processed then quantity will be display in monitor using seven segment display. By this proposed method time will be reduced to monitoring the food grain and also to decrease the manpower.

IV. RELATED WORK

(1) An RFID solution for monitoring of storage time and localization of perishable food in distribution centre -Solution for the localization of a pallet whose food content has nearly reached in maximum storage time and also to minimize the loss of perishable food during the storage[6]. This system monitors the storage time of perishable food items that are placed on tagged pallets in the warehouse and triggers alter before the maximum storage-time is reached.

(2) Embedded E-nose application to sense the food grain storage condition- In Indian agriculture, the next challenge is to provide an effective, safe viable storage and handling methods particularly in unpredictable weather conditions [4]. The application of E-nose system along with smart embedded sensor system to study the deterioration food grain under different stress and room environmental condition to maintain environmental and storage at parameters of predefine level by monitoring of storage space.

(3) Monitoring and control grain storage using PLC- Proper monitoring of grains storage is essential to reduce grain loss. The present system involves human effort in most of the activities which reduce work efficiency and increase time consumption. In this project controlling and monitoring of grain storage area is fully automated by using PLC and SCADA is to control and maintain the temperature in storage area which prevents the formation of microorganism and spoilage of grains[2]. To measure the weight using a load cell placed under the conveyer belt and to direct the different size of bags to the respective storage places to detect and control the pests, rats using ultrasound technique.

(4) Overflow protection of level tanks using PLC- The level are considered as a input to the PLC and pump controlled by the output of PLC which pumps out the solvent or any hazardous fluid present the tank without letting into overflow. The introduction of automation will increase safety and prevent dangerous accidents which can be caused by human error. This type of system can be used in various industries such as pharmaceutical, chemical, oil and gas, food processing etc [7]. This system saves the tank from overflowing which increases the safety and efficiency.

(5) Intelligent system for monitoring and controlling of the grain condition based on ARM9-The grain environment Information such as temperature, humidity and CO2 concentration is collected and stored by multi-sensor. Then the data is processed via multi-regional information fusion. The levels of the grains condition are predicted based on the BP neural network [5]. The Experimental results shows that grain condition intelligent monitoring system designed in this paper has many good feature such as good site stability, easy acquisition and real-time on- line detection.

V. DESCRIPTION OF PARTS

5.1 ULTRASONIC SENSOR

Fig 5.1.1 : Ultrasonic sensor

An Ultrasonic sensor is a device that can evaluate the partition to a challenge by using sound

waves. It distributes isolate by sending a sound wave at a specific repeat and tuning in for that sound wave to skip back. By recording the snuck past time between the sound wave being delivered and the sound wave bouncing back, it is possible to learn the partition between the sensor and the inquiry. It emanates a ultrasound at 40 000 Hz which experiences the air and if there is an inquiry or obstacle on its way It will skip back to the module. Considering the development time and the speed of the sound you can process the detachment. The HC-SR04 Ultrasonic Module shown in fig 5.1.1 has 4 pins, Ground, VCC, Trig and Echo.

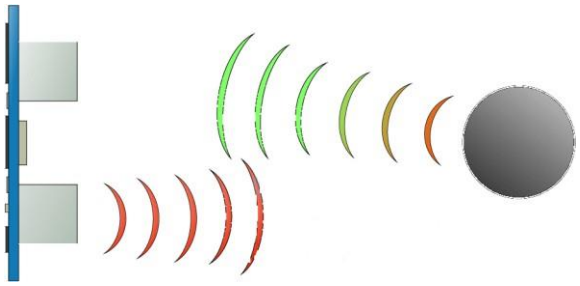

Fig 5.1.2: Sound Wave

To create the ultrasound you have to set the Trig on a High State for 10 µs. That will convey an 8 cycle sonic burst which will go at the speed sound and it will be gotten in the Echo stick shown in fig 5.1.3. The Echo stick will yield the time in microseconds the sound wave voyaged.

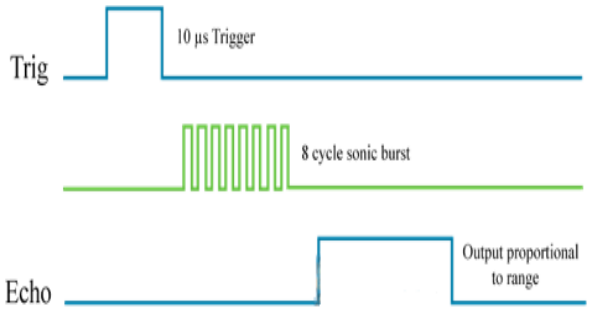

Fig 5.1.3: Wave Form Of Ultrasonic Sensor

Calculation

If the dissent is 10 cm a long way from the ultrasonic sensor and the speed of the sound is 340 m/s or 0.034 cm/µs the sound wave ought to circumvent 294 u seconds. However, what you will get from the Echo stick will be twofold that number in light of the way that the sound wave needs to development forward and skip backward. So remembering the true objective to get the detachment in cm we need to build the got travel time a motivating force from the resound stick by 0.034 and parcel it by 2.

Distance= (speed of sound*time taken)/2

Advantage Of Ultrasonic

The ultrasonic sensor has high recurrence, high affectability and high infiltrating power in this manner it can without much of a stretch identify the outer or profound items.

Application

- Circle control
- Roll distance across, strain control, winding and loosen up
- Liquid level control
- Thru bar location for rapid checking
- Full recognition
- Thread or wire break recognition

5.2 ARDUINO PRO MINI

Fig 5.2.1: ATMEGA 328P

Arduino star little is a microcontroller board in view of the ATMEGA328.A figure shown in 5.2.1 it has 14 computerized info or yield pins. 6analog contribution on board resonator, a reset catch and openings for mounting pin header. There are two adaptation of the ace smaller than usual one keeps running at 3.3v and 8MHZ, the other at 5v and 16MHZ.

There are 4 sticks in Arduino expert smaller than usual – reverberate, trigger, VCC, ground. The FTDI Basic will be utilized to program (and power) the Pro Mini. The headers are discretionary, however

they're our favored method to interface different gadgets to the Pro Mini. The Mini packs nearly as much chip punch as the standard Arduino, however there are a couple of significant equipment transforms you ought to know about before you begin adjusting your venture to the Mini.

The main glaring equipment contrast is the voltage that the Mini works at: 3.3V. Dissimilar to the Arduino Uno, which has both a 5V and 3.3V controller on board, the Mini just has one controller. This implies in the event that you have peripherals that exclusive work at 5V, you may need to do some level moving before you connect it to the Pro Mini (or you could go for the 5V variation of the Pro Mini).

Another real variety from the standard Arduino lies in the speed at which the ATmega328 runs. The Pro Mini 3.3V keeps running at 8MHz, a large portion of the speed of an Arduino Uno. We put a slower resonator on the Mini to ensure safe task of the ATmega328, 8MHz is still bounty quick, and the Mini will at present be equipped for controlling any undertaking the Arduino Uno can.

5.3. USB-TTL

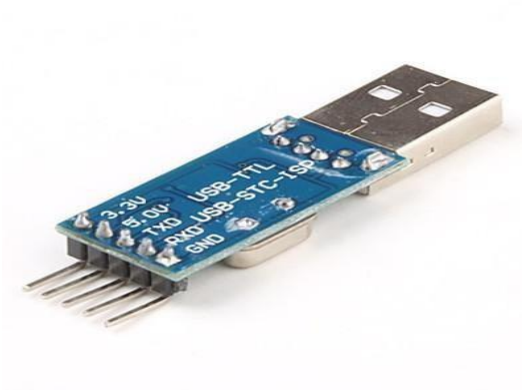

Fig 5.3.1: USB-TTL

USB, short for Universal Serial Bus, is an industry standard that was made to depict affiliations, connectors and traditions for organization together, correspondence, and power supply among PCs and their periphery contraptions shown in figure 5.3.1. USB was depended upon to regulate the relationship of PC peripherals (checking reassures, pointing contraptions, mechanized cameras, printers, versatile media players, circle drives and framework connectors) to PCs, both to pass on and to supply electric power. It has, everything considered, supplanted a social event of before interfaces, for instance, serial ports and parallel ports, and additionally segregates control chargers for flexible contraptions – and has ended up being customary on a far reaching accumulation of devices. The USB TTL Serial affiliations are a level of USB to serial converter joins which give create among USB and serial UART interfaces. Degrees of affiliations are open offering receptiveness at 5V, 3.3V or customer picked flag levels with various connector interfaces.

Future

- Stable and strong chipset CP2102. USB detail 2.0 pleasant with full-speed 12Mbps.
- 6pins for 3.3V, RST, TXD, RXD, GND and 5V.
- All handshaking and modem interface signals. Baud rates: 300 bps to 1.5 Mbps. Byte get bolster; 640 byte transmit support.
- USB suspend states maintained by methods for SUSPEND pins.
- Temperature Range: - 40 to +85.
- Size: 42mm X 15mm.
- Weight: 4g

VI. WORKING PRINCIPLE

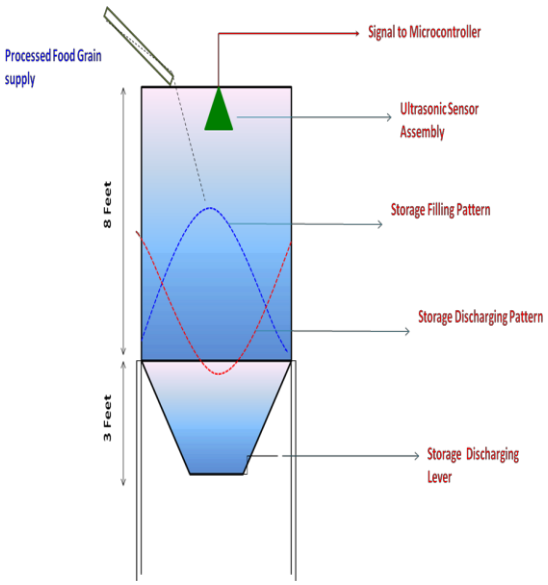

Fig 6: Storage Food Grains in the Container

In the food grain industry there are several containers to be used for storing the food grains as shown in the figure 6. After that the food grains will be taken into a multiple packs to selling into the market. In this project contains ultrasonic sensor, microcontroller, USB2TTL, 7 segment display.

A container having 2 shapes, top of container is rectangular and at the bottom of container is cone shape. Inlet of container a food grain will stored in cone shape of storage pattern. It also looks like a cone shape even by discharging the storage amount of grain. Ultrasonic sensor is used measure the quantity of food grain stored in the container. In this ultrasonic sensor is placed on the top of the container, from this a sound waves form the echo pin passed on the stored food grain and that a signal get reflected back to the trigger pin. A signal from trigger pin is given to the microcontroller. In the microcontroller, programmer is used to convert CMOS logic into corresponding input to the microcontroller.

After further processing of microcontroller an output signal will be displayed in the 7 segment by this BCD to 7 segment decoder to covert the 4bit signal from microcontroller into 8bit which is given to display.

VII. RESULT AND DISCUSSION

Here we have taken wheat as grain to test the system. The two types of wheat sample are taken one is maximum quantity of wheat and another is of wheat.

Table 7: Result of food grain storage in container

TEST 1	AMOUNT OF GRAINS 90%	LEADS TO OVERFLOW
TEST 2	AMOUNT OF GRAINS 10%	LEADS TO DRAIN

VIII. CONCLUSION

This system overcomes drawbacks of traditional approach of grain storage and provides flexibility and reliability to access status grain data, where controlling action minimizes grain wastage as well as grain loss. Difficulty in monitoring the food grains in the container is a major issue. In this regard, digital system based distance monitoring with ultrasonic sensor is developed. Data modules will display in serial monitoring are implemented successfully. Developed system is capable of monitoring the storage level by not getting so closer to the container. The food grains existing inside the container is displayed on the 7 segment display module unit using ultrasonic sensor. The digital system for storage monitoring of grains in the container in the food processing industry is implemented successfully and they assure that the desired accuracy is sustained for a long period. The developed system is of low cost, and an energy efficient one.

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