EasyChair Preprint

№ 9263

A Review on Smart Warehouse Management System

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November 7, 2022

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***Abstract*—The Internet of Things (IoT), in recent decades, has been explored to develop new technologies that work in a variety of ways in various technologies, especially in the food industry. The field of rice, wheat, and grain to protect the environment is extremely challenging because of its promising potential. We are proposing a low-cost system called the SMART WAREHOUSE MANAGEMENT SYSTEM (WMS), to develop remote remote management capabilities for storage in a flexible environment. Our system is made up of temperature, humidity, smoke, odor, humidity, and acoustic sensors connected to the nodes-MCU, and gas sensors, which provide vital information needed to achieve the quality of food. This information is transmitted to the Blynk cloud wirelessly by providing a visual interface where the user can track changes in product quality from time to time. WMS provides an easy-to-use visual and analytical sensor data application for an effective and inexpensive monitoring system. Test results prove that system performance is perfectly balanced and can meet design requirements in real-time and remote data collection. A unique approach is proposed by WMS to collect data in an environment that eliminates the need for cables or manual labor.**

Keywords— WMS(warehouse monitoring system), AI(artificial intelligence), Arduino IDE, node MCU, Blynk application and sensors

I. INTRODUCTION (*HEADING 1*)

According to the FAO (Food and Agriculture Organization), 1.3 billion tons a year are reported food losses account for 33% of total production. Demand for food is growing steadily and could reach about 150-170% of current demand by 2050. Moreover, according to the World Health Organization (WHO), about 1.7 million deaths a year worldwide are associated with malnutrition of food, Due to temperature variation around 24% of food grains being wasted every year Estimated around 17% of food grains are spoilt due to insects and microbes. Approximately 14% of grains are being degraded by moisture. Approximately 5% of grains spoilt by birds. We have to prevent the food spoilage Warehouse being the top priority for storing goods like food grains, rice, wheat etc.

As noted by the Food and Agriculture Organization studythat temperatures are high, the minimum must be grain moisture to ensure good crop conservation. Due to the high temperature, food is slowly reduced and high humidity leads to problems because it promotes mold and insect problem. Lack of proper care can be devastating to farmers. This resulted in their huge loss of income.

The main purpose of this project is to improve the IoT instrumental Warehouse Traceability System, which will enable farmers to keep track of live data on temperature, humidity and other parameters at very low cost so that live monitoring is very easy. Using a growing technology repository can store goods and prevent decay before they occur. An added benefit with a fully automated and fully customized warehouse management system**.**

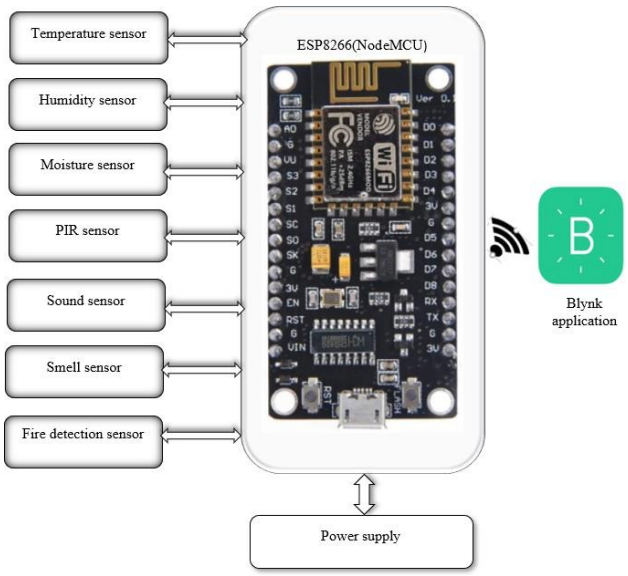
Rice - White Rice, commonly referred to as refined rice, is the main source of food for more than half of the world's population. The best storage temperature for rice is 40 ° F or less; however, rice stored at a constant 70 ° F with oxygen in the air will last well for about 10 years. In cool refrigerated storage containers for oxygen-free containers can be stored for up to 30 years.

Wheat- Storing at temperatures above 60 ° F causes a very rapid decline in seed growth but a much faster loss of feed value. A relative humidity above 12% promotes mold growth and the deterioration of wheat chemicals. Excessive humidity levels above 12% may allow the wheat to begin to decompose, resulting in chemical reactions. Above 15% humidity will allow the mold to grow. When the humidity reaches 20% some germs can begin to grow. The result is rotten wheat that is not ready to be used.

Cereals - Cereals are kept at a humidity of 14% or less and seeds are stored at a humidity of 12% or less. The grain is protected from insects, rodents, and birds. The grain is protected from rain or by absorbing moisture from the surrounding air. Cereals and seeds stored at humidity levels above 14% may cause mold growth, rapid loss of function, and decreased food quality.

Methodology

Each sensor connected to the NodeMCU, the output of eachsensor is taken and virtually writing in blynk cloud. Setting different threshold for different types of sensors, Arduino ideused to dump the code to node MCU.



If the value exceeds the threshold, we get blynk email and blynk notification. Based on the notification, we can take precautionary measures, blynk mobile application used to see parametric values remotely.

II. Literature Review

Literary survey plays an important role in the project and therefore cannot be underestimated. The fundamental goal of research is to come up with a fresh concept by analysing the flaws and roadblocks in the current system. This study is done before the start of a project and involves gathering information from numerous sources, analysing it for project requirements, and combining research into various technologies and existing technical faults. It also entails a comparison of current and prospective initiatives. For in-depth investigation and a more successful completion of our project, the following assumptions were established in numerous research publications. A few key points from this project have been briefly explored.

[1] This document aims to develop an internet of things based on a WMS. The sensor network includes humidity, temperature, fire detecting sensor. It is created with the aid of IoT and the raspberry zero model controller accepts Internet of things to transmit messages. An active free software language python is used for editing. The result of thispaper is that they create a sensor connected to the sensor andcontroller and thus send alerts used by the extended as wi-fi extension. If there is any change in the environment then the IoT will send alerts via text message.

[2] The purpose of this paper is to preserve the safe fruits and vegetables. This paper introduces natural features found in fruit storage quality and common protection methods and proposes a multi-parameter Wi-Fi monitoring system. This paper mainly contains the PIC16F877A microcontroller, an internet of things, there are four sensors of heat, light, humidity, gas sensors. Connected to the PIC microcontroller where it sends the portable parameter values to thingspeak.com. The data collected from the talk server can be used to perform various MATLAB analyzes, MATLAB perceptions by analysts to make a difference in the setting in line with the changes in the repository..

[3]. This paper introduces an intelligent IOT cold storage system for better asset management. This type of proto includes cool Io-based cold storage. This paper contains a raspberry pi containing built-in wi-fi, the ARDUINO HX7111C and a temperature sensor. This model uses web-camera to detect the apperance of objects, ARDUINO is used as a weight regulator and the raspberry pi-3 as a home server. The regulator will collect all the information and send it to the raspberry pi-3 using the python weighing item when placed in the detected storage box..

[4]. This paper introduces an intelligent real-time monitoring system and an online-based notification system enabled by real-time monitoring of temperature, relative humidity, light and gas in a cold environment and this paper contains wireless module communication technology, android. application, microcontroller, IoT, implementation of this paper to continuously monitor real-time environmental parameters.

[5] This paper entitled Smart Warehouse Management System Concept With Implementation, Distribution Companies, WMS is an major part of the company and makes the processes easier to follow this paper explains the concept of Smart WMS used in one of the major distribution companies in Bosnio and Herzegovina, the program uses AI and algorithms to improve the process. A well-executed process can replace time- consuming the concept described in this paper into a standard WMS by providing an advanced solution for users the concept used improves product placement of stack layout in the selection, transfer process and delivery orders and the tracking process.

[6] This paper is entitled Warehouse Management System Development Based on Open-Source Web Framework With the growth of product type many companies that intend to

manage the repository rely on WMS, however the price is too high due to the complexity of this paper developing WMS. small business. in addition, the software archives the intended storage archive example storage, stock acquisition, garage replacement and other basic functions The second part of this paper develops a communication system between their mineral monitoring client that recognizes server information in PLC. this paper introduces mainly the basic procedures and methods of the asset management system established by the local youth and this paper adopts a boos trap, which is an open source id, a good and flexible framework.

[7] This paper entitled Designing and Implementing an Aop Asset Management System based on Aop Asset Management System is a response to reducing the cost of establishing and improving customer satisfaction. well-covered items on the outside make it work. It makes the design and codes more modular and more organized making the concern local and not widespread throughout the system. This paper designs and implements an AOP-based asset management information system emerges by making the sketch of this system completely meet the growing needs of complexity and accuracy in latest storage management.

[8] This paper introduces a study of the asset management system based on organizational rules, according to the organization rules obtained the system can analyse the number of assets involved in organizational rules according to the algorithm of organizational rules laid down for testing, analyzes data in inventory assets, can be divided into two that is, to get the sets from the payment and set to receive organizational rules that satisfy the minimum support. apply organizational rules to the asset management system, where the purchasing staff decides to purchase the goods, the value of which is less than the minimum inventory. An asset management system based on organizational rules will be developed. Obtained rules for analyzing data in the system.

[9] Smart Warehouse Monitoring Recommended Using Iot. This store should be inspected periodically to reduce grain storage costs due to weather, the goal of this study is to develop intelligent vibration using IoT, mugginess, temperature, and fire detection sensors. It is created using IoT and the Raspberry Pi. IoT technology is used by the Raspberry Pi controller to send messages. The appropriate data is obtained and processed using the given software based on the outflow sensor, and timely information is sent to the impacted officials through SMS for measurement and remedial measures from the airspace inside the storage region. The most difficult part is capturing the changes that have occurred within the repository. the usage of the LM35 to record temperature variations The moisture content is measured using DHT11. SW420 is a seismograph. A light-dependent resistor can be used to detect fires., The Raspberry pi has an internal Wi-Fi module to which IoT is connected. It also has an SD slot that maintains a limited range for each sensor.

[10] Introducing the Store Asset Management and Management System Based on RFID proposed authors in this paper hardware and software management program and RFID-based asset management and describes the design process and implementation process. The writing task is done using an electronic tag with a marker reader. Asset management is enacted with PLC in accordance with the SIEMENS Win CC config software and OPC automation. With access to the SQL server, tasks such as automatic data storage, query and deletion of warehouse information and information are accomplished. Computer hardware includes EFAT / LC testing, portable computer control, electronic marking system and marker information display device. the article introduces an automation system based on radio frequency identification as an example of the integration of electronic marking technology with object control/management.. It performs the various functions such as warehouse and store that delivers inventory processing, storage, location information, warehouse removal and additions, warehouse operations management and customer information inquiries, etc. The program incorporates information technology and tools to improve efficiency.

[11] We have introduced the IoT Instrumented Food and Grain Warehouse Traceability System. The writers knew that Wise storage of grain plays a very important role when it comes to grain safety associated with grain loss and grain rot. Loss can be reduced, which increases the amount of food available. In this article, they have proposed IoT-enabled monitoring systems for use in villages where access is limited to farmers with good storage facilities to reduce grain loss and increase grains security. The proposed framework monitors final parameters such as temperature, mugginess, CO, movement, vibration, and high gravitational force. The ESP32 Wi-Fi module collects data from sensors and this module sends data to the Node-red fascia through a MQTT vendor. This function demonstrates the design and implementation of a food storage monitoring system. It offers an inexpensive IoT based solution
.

[12] Introduced grains quality and availability Price in Cold Storage using IoT. authors have presented a IoT cold storage management system in this research to address the challenge of preserving grains quality and quantity. Their solution incorporates a number of IoT devices, cloud apps, and an Android app. Based on their testing, the authors discovered that their proposed model accurately detected the amount of food when it began to decay by using a UV sensor that provides a food storage container that can calculate the amount of food, and the purpose of the MQ4 gas detection sensor is to detect gober gas in the atmosphere, which influences grain quality.

Conclusion

Most of the authors used temperature and humidity sensors only, use of Raspberry Pi and other microcontrollers are way expensive than node MCU which we are using, Many of them didn't work on other spoilage of food grains they mostly concentrated on cold storage. To develop a WMS

for implementing our project we taken few pros from this review survey, our main objective is to give a cost effective as well as cost efficient easy to use multisensory system to farmers, concluding that "In Winter's chill or Summer's heat, Farmer's work so the world can eat"

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