Development of Wireless Weighing Scale for ERP Software in Cashew Industry

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Abstract—**With ever changing software industry which has reached the peak of automation it required that all the domains are equipped with automated systems. The cashew industry plays a very important role in the economy of our country, with a major part of the produce being exported. But this cashew industry is yet to see a lot of automation. The entire process of cashew production is manual with few machines providing automation added just recently. There are ERP software's available for the cashew factories to provide the first level of sophistication. Our methodology proposed here provide a step towards the next level. The idea will be designed and developed as a standalone application which will act as an extension to ERP software's. It is a combination of hardware and software put together to achieve a great deal of easiness from a process which otherwise require manual work. We propose to design a system involving a hardware unit containing a controller device along with a load cell and other accessories, which will communicate with the central database through an Android phone. In the cashew production process, there is a stage in which the cashews need to be peeled. After the cashew is cut through the hard-outer shell, there is another thin layer of skin on the edible cashew kernel, which needs to be removed. This peeling process is done manually by household ladies at per kilogram rate. Our system will help cashew producers to deliver cashews to the women for peeling process without having to make register entries. This process of keeping track of cashews delivered to the working women is done on a central server database.**

I. Introduction

In today's world of industrialization, it extremely important to bring down the manufacturing cost to improve the profits. If the profits improve the break-even point can be reached early, hence improving the standards. This is a concept of automating the process of distributing the cashews to women for the process of peeling in a cashew industry.

In the Cashew industry there are many processes that happen, starting with the raw material which is having a hard shell around it, which needs to be first roasted and broken. The second process which is peeling the inner thin skin which the cashew kernel has around it. For the second process of peeling the inner thin skin it requires a lot of man power and man skill. This process is still done manually. When cashews are distributed to employees for peeling the inner skin, the employees are normally ladies who carry these cashews home to do the work.

Before they take the cashews home for peeling the cashew industry manager weighs accurately the amounts of cashews given to each woman and makes an entry in a register. When they come back in the evening to

return the finished peeled cashews. They weigh the cashew and the skin peeled off. Together it should be the weight given in the morning. This process is now completely manual, where registers is maintained etc.

We propose a system where this process of cashew distribution to women is automated by interfacing the weighing scale directly with the PC. The entire process of giving away the cashew, maintaining record of how many kilos of cashews peeled by individualwomen for paying wages are generated automatically. This not only improves efficiency but also overcome manual errors.

Demands of digital weighing machines are on the increase for businesses that deal on measuring items because it gives the precise and exact measurements of weights of objects. The digital weighing machine gives a high accuracy and efficiency in measuring weights of items and this brings about satisfaction to the producer/seller and the buyer. Sensing devices such as transducer load cells are employed in analog weight scales.

These weight scales do not utilize digital processors and they are read in an analog manner. These analog weight scales utilize a rotating pointer which rotates. There are disadvantages to the analog weighing indicator which are high power consumption because the actuators are electro-mechanical in nature. The actuator works with high current, low resolution which is caused by the fact that there are little differences in the weight of various objects which are not easily detected and the efficiency of the analog weight scale is low due to the rotating pointer which always shakes or moves.

A digital weighing machine was developed which is used to measure weights ranging from 0kg to 40kg which is very accurate. The electronic digital weight indicator developed utilizes the following; Arduino Uno microcontroller, a 40kg Load cell, an HX711 Load cell Amplifier Module and a 16x2 LCD.

II. LITREATURE SURVEY

A. Development of an Electronic Weighing Indicator for Digital Measurement.

[3][8]This paper presents the development of an electronic weighing indicator for digital measurement. The objectives of the system were to read weight measured in the conventional analog form to digital form, achieve high precision in measurement and calibration. These components used for this research are Load Cell, Hx711 Load Cell amplifier, Arduino Uno Microcontroller, and an LCD module. In this research, a 40kg load cell is used. The load cell sends output signals of the mechanical weights measured to the Hx711 module which amplifies and sends the output to the Arduino microcontroller. The microcontroller calibrates the output signal with the aid of the load cell amplifier module before sending the signal which is already converted to digital form to the LCD module for display. The system developed has proved that a digital electronic weighing system can be low cost, miniaturized, detached and can take accurate readings devoid of errors.

Load cell was used to sense weights of objects by [1], the load cells worked as sensors. When load was applied on the load column, it was compressed while its length changed. The column acted like a primary transducer because the force applied was converted to change in length. The length change, was not directly measured while the strain gauge connected to the column for the load got compressed. While the load column acted as a primary transducer, the strain gauge acted as a secondary transducer because it recorded the displacement of the load column. While the strain gauge got compressed, its length changed depending on the magnitude of force applied to the top of the load cell. The resistance of the strain gauge changed when there was a change in its length. Resistance change was measured in terms of output voltage change and could be amplified using a differential amplifier. When the voltagebecame negative, it was made positive by the inverter therefore, the load cell gave a voltage level which was equivalent to the applied weight.

B. Development of Digital Weighing Scale for Finding Adulteration & Cost Standardization.

[4][8] In today's scenario there is lot of advancement in digital weighing scale but there is no weighing scale that finds the percentage of adulteration in food sample.Adulteration is big issue as far as food samples are concern. Due to eating of adulterant food causing many diseases to human body.Children are infected by this adulterant food very soon, So all this difficulties are solved with the help of new digital weighing scale. This scale is used to find not only weight of food sample but also it gives the percentage of adulterant in food sample with the help of machine vision camera. This scale is a complete solution for customer side.

1. Manual peeling is done by gentle rubbing with fingers or by use of special peeling knife; with this operation 10-12 kg of kernels can be peeled per day, an article about cashew processing referred in. The mechanized processes of peeling differ widely. They include air-blasting, suction, a freezing operation and a system of rubber rollers. The operation has a low efficiency due to the difficulty of

removing the tests and the amount of breakages can be as high as 30%. Currently research and development is taking place to improve the viability of the mechanization of this operation.[7][11]

2. The procedure of weighing the product and dispensing or collecting is not new, it is also used for collecting raw milk from small farmers in society dairy hubs.[5][10]

Dairy industry is largest industry in India which collects milk from farmers and produces different dairy products. As Agriculture is backbone of the country and dairy farming is major business for farmers, the proposed system will make this collection, billing process of milk from farmer to dairy more-faster, reliable, accurate and less-costlier. The proposed system contains POS (Point of Sale) module and software running on it which includes in crane weighing scale withGPS / GPRS module. System is mobile so it can be carried out in vehicles like car, bicycle or trucks. The vehicle goes to individual farmer, farmer swipes their smart card, person collects milk by weighing it, generates the billing slip to farmer, and the data will be transferred to Centralized system using GPRS. Meanwhile centralized system will track the location of vehicle by GPS. The centralized system is able to locate the vehicle, make the changes in rates for billing.[5][10]
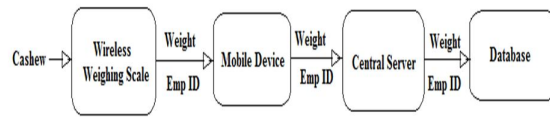
III. Methodology
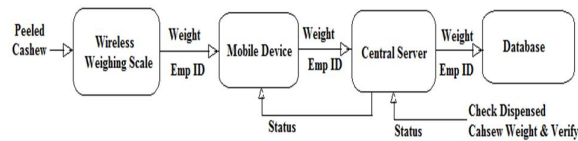

Fig1: Dispense Cashew for Peeling Process

Fig2: Return of Peeled Cashew

The aim is to implement an Automated Cashew dispensing and collection system for peeling process which uses the weighing scale for measuring the weight of the cashews wirelessly, and an Android application to scan the Barcode for identifying the employee and storing the data in the central database.

As shown in the Fig-1, Cashew are distributed by weighing them of the fixed weight and the weight is shown digitally and that information is sent to the Mobile device along with the employee Id. The employee Id and weight of cashew is stored in the database through the central cloud server.

As Shown in the Fig-2, The peeled Cashew is returned back by the employee, the peeled cashew is weighed and the measured weight is shown digitally and that information is sent to the mobile device as a signal. Then the weight is verified in accordance to the data of dispensed weight. After it is verified, the status is sent back to the mobile device. Then this system will generate report on respective employee and salary.

A. Load Cell

A is a type of transducer that measures the force,specifically a force transducer. It converts a force such as tension, compression, pressure, or torque into an electrical signal that can be measured and standardized. As the force applied to the load cell increases, the electrical signal changes proportionally.

B. Data base Creation

For the data collection some fixed amount of cashews nut is kept on weighing machine and this measured weight is stored in the database. The system has a portable device (Weighing Scale) which records Emp-ID and Weight of Cashew dispensed.

C. Arduino Board

It is a basic single board microcontroller designed to make applications, interactive controls, or environments easily adaptive. It consists of features like USB interface, analog inputs and GPIO pins which allows the user to attach additional boards.
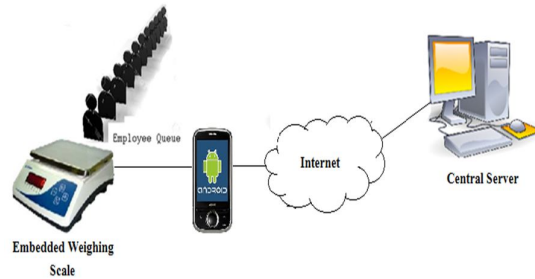
IV. System Architecture

Fig 1: A Snapshot of theArchitecture

A. Existing System

In the existing system the entire process is manual, where a normal weighing scale is used to dispense the cashew to the contract employees. The entries are made in a register as to how much weight of cashews are given to which employee which is again verified manually after the cashews are returned back after peeling. And then at the end of the week during the salary/wage payments each employee's entries are checked in the register and wages is calculated.

V. Results

A. Comparison between Traditional Systems and Proposed System

In the traditional System cashews were issued to workers in a more of manual method. Cashews were weighted on scales and issued to workers after making a manual entry into registers. These weighing scales and registers had to be carried everywhere the cashews were distributed. Another problem with traditional system was that calculation of wages was again a manual process. The calculation of wages and payment of wagesis done weekly, this process requires calculation of wages by looking at the number of cashews peeled in that week. Any advance taken by a worker needs to be taken into consideration. Hence the entire process was tedious, time consuming and error prone.

In the proposed system one portable device which has the capability of weighing, recording and also calculating the wages in almost no time is developed. The system makes the entire process seamless and increases the overall ROI. Cashew industries are looking to automate almost every stage of cashew production, All the way from cutting, grading to salary calculation. Hence this system is one step towards sophistication of the cashew production.

VI. Conclusion

This paper aimed to examine and investigatethe entire process of giving away the cashew, maintaining records is automated. Hence, we can conclude that, it not only improves efficiency but also overcome manual errors.

References

[1] Cashew Nut Processing manual – the basics, https://www.unido.org/fileadmin/ user_media/Publications/Cashew_nuts_final_presentation_PP.pdf

[2] Raw Milk Collection Using Pos (Point Of Sale) and GprsTechnology,Mr. Ankit V. Shingala Int. Journal of Engineering Research and Applications www.ijera.com ISSN: 2248-9622, Vol. 4, Issue 8(Version 1), August 2014

[3] International Research Journal of Engineering and Technology (IRJET), Volume: 05 Issue: 09 | Sep 2018. Akindele Ayoola E., Awodeyi Afolabi, Matthews Victor

[4] Development of Digital Weighing Scale for Finding Adulteration & Cost Standardization International Journal of Scientific & Engineering Research, Volume 5, Issue 10, October-2014Kunal.D.Gaikwad, Dr.P.B.Dahkar,

[5] Anonymous (2009). Statistical Information, Annual Report, Directorate of Cashew and Cocoa Development, Kochi, India. 2006-2007: 23-28. Azam-Ali SH and Judge EC (2001). Small-scale cashew nut processing. Rugby, UK: FAO.

[6] Balasubramanian D (2001). PH—postharvest technology: physical properties of raw cashew nut. Journal of Agricultural Engineering Research, 78(3): 291-297. Bhoi PR, Singh RN, Sharma AM and Patel SR. (2006). Performance evaluation of open core gasifier on multi-fuels. Biomass and Bioenergy, 30(6): 575-579.

[7] DGCIS (2011). Exports and Imports, DGCIS- DirectorateGeneral of Commercial Intelligence and Statistics, Govt. of India Reports, New Delhi.

[8] FAOSTAT. http://faostat.fao.org. (Accessed on 21.07.13).

[9] Hebbar UH and Ramesh MN (2005). Optimisation of processing conditions for infrared drying of cashew kernels with testa. Journal of the Science of Food and Agriculture, 85: 865-871.

[10] Jain RK and Kumar S (1997). Development of a cashew nut sheller. Journal of Food Engineering, 32(3): 339-345.

[11] Kamath V and Rajini PS (2007). The efficacy of cashew nut (Anacardiumoccidentale L.) skin extract as a free radical scavenger. Food Chemistry, 103(2): 428433.

[12] Kannan KP (1978). Employment, Wages and Conditions of Work in the Cashew Processing Industry. CDS Working Paper No. 77, September. Trivandrum: Centre for Development Studies.

[13] Kyle S (2009). Cashew Production in Guinea Bissau. Working Paper 2009-25. Itahaca: Cornell University. Department of Applied Economics and Management.

[14] International Journal of Scientific & Engineering Research, Volume 5, Issue 10, October-2014 Kunal.D. Gaikwad, Dr.P.B. Dahkar,