Development of Cloud-Based Agriculture Marketing System with Intellectual Weigh Machine

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Abstract. Agriculture is the backbone of Indian economy. Agriculture is most important occupation for the maximum number of the Indian families. Though technologies developed so much still farmers did not get the reasonable price in the market for their agricultural products because of intermediaries. Today most of the distribution systems are facing many challenges like intermediaries, in between the producers and the customers, seeking to earn more profit. Hence there is need for a more regularized system to avoid the intermediaries and agriculturist should get more gain out of their product. The aim of the system is to develop a better, efficient marketing system using intellectual weighing system using Load cell, Raspberry-pi module. It includes security and easy consolidation of the bill. The conventional system has intermediaries because of whom the profit of the producer will be getting affected. In the existing system, works which include entry, product weighing, product distribution and product delivery are done manually. Proposed system includes proper data from the databases to be sent to corresponding users. It facilitates the interaction between producer and buyers and enables the buyer to buy product easily. Stock maintenance in the distribution center is established.

Keywords: Producers, Intermediaries, Buyers, Internet of Things, Distribution System

1. Introduction

In today's world, people involved in agriculture are facing a lot of problems due to profit making mentality of intermediaries, water scarcity, lack of mechanization, soil erosion, scarcity of capital, etc. even though there is high demand of products. Among these agricultural marketing (profit making minds of the intermediaries) endures to be in a worst form in rural India. People depend on intermediary for the disposal of their own farm products at a very lower price. For example, these intermediaries get the grains from the farmers for lower cost in their harvesting period since their product is in less demand. These intermediaries keep the stock of these grains unless the demand for each type of grain rises (i.e., during sowing period) so that they can earn more profit by selling the grains in higher costs. By doing so, the people suffer from buying grains at affordable cost and also farmers earn less profit. According to a survey, in West Bengal 85 % of wheat, 90% of Jute and in Uttar Pradesh 75% of oil seeds, in Punjab 70% of oil seeds and 35 % of cotton is retailed by farmers in the village the aforementioned because of low demand outside. Because of their poverty, the farmers are not able to wait for a longer period for marketing the agricultural products to a reasonable rate after harvesting. There are various research publications [1]-[14] in the embedded domain in the aspect of providing solutions for the real time difficulties in day to day life. Phulphagar,Vipul[1], discussed to measure weight upto 180 Kg with the aid of load cells. The goal of this project is to design and

develop intellectual real time weight machine for weigh measurements and have charts, dashboards to monitor. Arduino with the help of RTC DS3231 alarm interrupt enters into sleep mode and wakes up periodically. This technique is useful in finding the necessary resources whose production cost is high and whose resource will have larger impact on the cost of production and searching for the necessary alternatives in which the cost of the product decreases. Muthunoori Naresh et al[3] discussed to increase the efficiency of the of smart agricultural system. The first step of this system is to read the temperature sensor and humidity sensor values. The details are sent to the microcontroller. ARM processor has 64 pins. The Internet of Things (IoT) would be internetworking connection. Fitzgerald et al[4] planned the construction of the weight measurement using the wireless sensor node. The node was established by means of an off-the-she lfATmega 1281 based platform. This platform was intended for emerging low power WSN prototypes. Mythili et al[5] developed a idea of IoT in the smart farm monitoring and automation structure has been developed in order to monitor the various functionalities of farming. The temperature, moisture, and humidity statistics which are accountable for triggering diseases in a crop field were sensed and stored on cloud and then the investigation is made.

The dominant objective of this project enables the farmers to sell their product directly to the seller without the influence of intermediaries. Because of direct contact with seller they gain more profit and its saves their livelihood and also it increases quality of the product. It leads to deliver the agriculture product to the consumer with low cost. In future, this project will be expanded for all variety of farming products and the farmers can sell their products directly with buyers. And also, it makes a way for farmers to sell their product directly to the common people who require more quantity with quality continuously within the time period. It is done by arranging a transport facilitate for export agricultural goods by a group of farmers and group of vendors within a geographical area where a similar crop is cultivated within a period of time.

2. Components Required

The Hardware requirements for the design of smart weighing system are given below.

2.1. Hardware Requirements

1. Raspberry Pi3 b+
2. 4*4 Keypad Module
3. Load Cell
4. LCD Display

2.2. Raspberry Pi3 b+

The Raspberry Pi 3 Model B+ model shown in Figure 1 is the latest production the Raspberry Pi 3 series, with a 64-bit quad core processor whose frequency is about 1.4GHz, wireless LAN of dual-band 2.4GHz and 5GHz, Bluetooth specification of 4.2/BLE, high speed Ethernet, and PoE ability through a distinct PoE HAT. The dual-band wireless LAN arises with modular agreement authorization, permitting the panel to be intended into end goods with meaningfully compact wireless LAN agreement testing, enlightening the cost and time together to market. The Raspberry Pi 3 Model B+ keeps the identical mechanical footprint as the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B together.

Figure 1. Raspberry pi 3 Model b+ board

*2.3. 4*4 Keypad Module*

The 16-button keypad offers a valuable human interface module for microcontroller developments. Convenient adhesive backing gives a modest technique to mount the keypad in a variety of claims.

Figure 2.4*4 Keypad Module

The 4*4 Keypad Module revealed in Figure 2 comprises the following features-

- Maximum Rating:24V DC,30 mA
- Interface with 8 pin access to 4*4 Matrix
- Operating Temperature range from 32 to 122 °F (0 to50°C)
- Dimensions of Keypad with the specifications as 2.7 x 3.0 in (6.9 x 7.6 cm) and Cable with the specification as 0.78 x 3.5 in (2.0 x 8.8cm).

2.4. Load Cell

This Load Cell used for weigh checking is strain gauge-based and is constructed from aluminium alloy for high accuracy. Load cell given in Figure 3 have the following features -

- Aluminum-alloy which is Colorless anodized and hermetically sealed with glue to IP65
- Easy to Mount
- High Accuracy
- Dimensions: 130x22x30 mm (Thread Hole:4-M6)
- Supports Pan size up to 250mm *350mm

Figure.3.Load Cell

2.5. 16×2 LCD

LCD modules are very generally utilized in maximum of the embedded products, because its minimum charges, accessibility and easy programming. 16×2 LCD shown in Figure 4 has 16 numbers of Columns and 2 numbers of Rows logically. A lot of varieties accessible such as, 8×1, 8×2, 10×2, 16×1, etc. But then the frequently needed one is the 16×2 LCD. In this type of LCD usually a total of (i.e.,16×2=32) 32 characters and individually a character will be composed of 5×8 Pixel Dots.

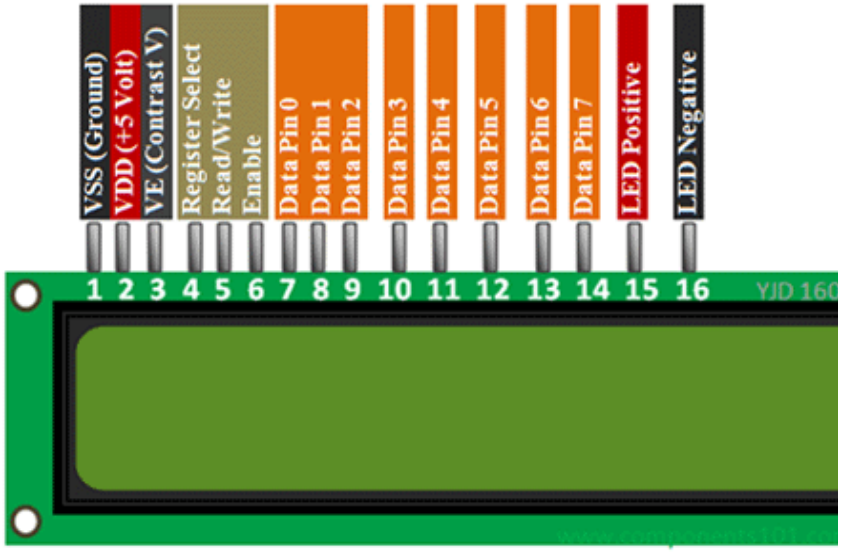

Figure 4.16×2 LCD Display

3. Software Requirement

Software requirements for the implementation of this project comprises of Virtual network computing viewer, Android Studio, Dbeaver.

3.1. Virtual network computing

Virtual Network computing (VNC) is a type of remote-control software that permits another computer to govern over a network linking. Keystrokes and mouse clicks are communicated as of one computer to another, consenting technical caring staff to accomplish a desktop, server, or other networked device deprived of being in the identical physical position.VNC is platform independent and is well-suited with all the operating system. Computers must be networked with TCP/IP and have open ports permitting traffic on or after the IP addresses of devices that may require to connect.

3.2. Android Studio

Android Studio is the authorized Integrated Development Environment (IDE) designed for Googles Android operating system, constructed on JetBrains; IntelliJ IDEA software and intended precisely aimed at Android advancement. It is existing meant for download on Windows, mac OS and Linux built operating systems. It is placement for the Eclipse Android Development Tools (ADT) as the key IDE for innate Android application growth.

3.3. Dbeaver

Dbeaver is a unrestricted, open source, graphical data base administration tool for database designer and administrators. DBeaver can be utilized to generate and accomplish databases across a widespread range of database administration arrangements. DBeaver works with utmost of the common DBMSs, such as MySQL, PostgreSQL, MariaDB, SQLite, Oracle, DB2, SQL Server,Sybase, Microsoft Access, Teradata, Firebird, Derby, and more.

4. Present Day Distribution System

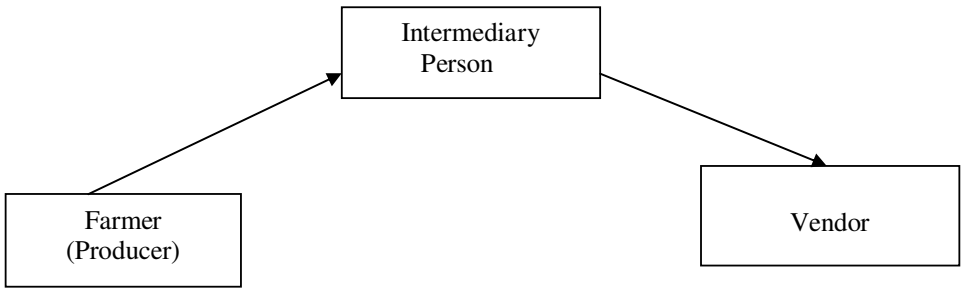

Figure 5.Present-day distribution system

Figure.5 shows the present distribution system in which the producer is unaware of the price at which the intermediary sells to the vendor and also, he is unaware of the stock keeping procedure of the intermediary. And similarly, Vendor is also not aware of the real price of the product (as such from farmer) and also, he is unaware of the stock keeping procedure of the intermediary. Because of this, consumer needs to pay too high for what he gets. So that the intermediary plays a dynamic part in determining the price of the product. This project provides a valuable solution to this problem by cutting down the role of intermediary.

5. Cloud-Based Agriculture Marketing System

In the present method there is no direct communication link between the farmer (producer) and vendor or customer. Intermediates play a major role between the producer and customer. Farmer get real price for their product. Vendors no need to contact intermediaries. In the cloud-based agriculture marketing system Raspberry microcontroller is used to upload the data to the cloud. Each farmer (user) can choose the type of product to be sold (eg: Fruits, Vegetables, Flowers), varieties of the product (eg: Apple, Banana or Cherry in case of fruits, Pumpkin, Radish or Onion in case of vegetables, Lily, Lotus or Rose in case of flowers) and quantity of each product (5 Kg of Radish, 10 Kg of Apple). This data is entered through the use of keypad. LCD displays the type of the product and weight of the product.

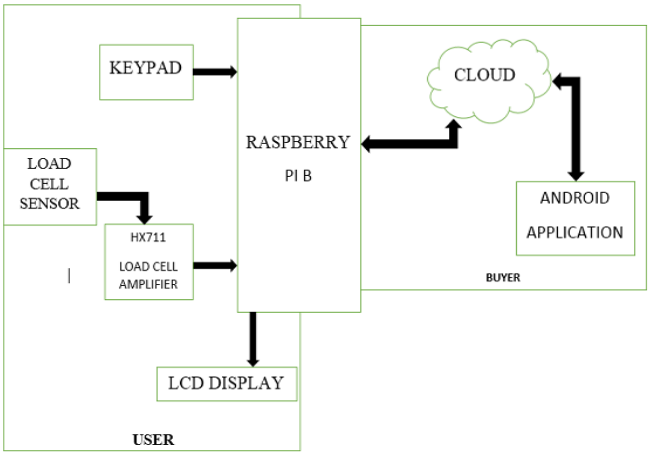

Figure 6. Block Diagram of the Cloud-Based Agriculture Marketing System

In this system, Load cell sensor in the Intellectual Weigh Machine is used to measure the weight of the object. The load sensor used here measures up to 10Kgs. Load cell sensor available in the market can measure up to 100Kg. Load sensor calculates the weigh to the product and displays it in

the LCD. These data are sent to cloud with the help of "Think speak" website. These databases are transferred to the application using API key. In Think speak website, username and password has to be created. It is an open source website. This hardware system has to be made available with each and every farmer. In this entire system two softwares are used. One software used is Android studio which is an application development software. It is established by google. Programming languages used are Java, Kotlin and C++. It can be configured as per the requirements of the User and application. Both users and vendors use this. First of all, the farmer has to give details such as user name, address, Mobile Number, Email Id, Company name and bank details such as Account number and IFSC number. User (Farmer) can add the varieties they have. They can also enter the type of product and the amount of quantity they have. In the application, each farmer's product details will be there when the application is opened. The price of the product of the farmer is not displayed in the farmer's app. In contradiction, the vendor (buyer) cannot edit the details of the product. He /She can just view it. A person who has signed in as a vendor need not to give his bank details such as account number and IFSC number. He should give details such as Vendor name, Phone Number and Delivery address. Software named D beaver is a data monitoring software. Past and present data can be viewed with the help of this software. The drawback of this software is that it is data limited for free. If more details need to be monitored, then it has to be paid. Proteus Simulation of Intellectual Weigh Machine is shown in Figure 7.

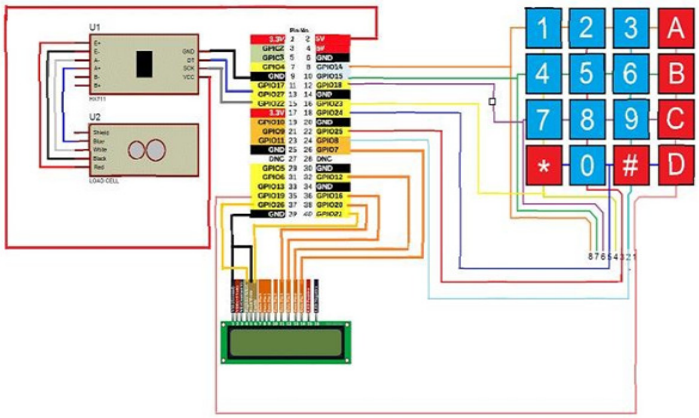

Figure 7. Proteus Simulation of Intellectual Weigh Machine

6. Result and Discussion

Using the GPIO pins of Raspberry pi3, the input from the load sensor is received, processed by microcontroller and the values are uploaded to the server. Load cell sensor in the intellectual weigh machine senses the weight of the object placed in the plate. LCD display is used to display the type of product and the weight of the product. Farmers can select the type of product which they have and they can give the quantity of items they have through the use of keypad. Android studio open source application development software is developed by google which uses the programming languages Java, Kotlin and C++ is used to configure the requirements of the User. Dbeaver is to create the database from the application to any devices such as mobile, PC in the tabular form. It is also an open source software and the data here are safe and secure. Things board is also an open source software through which the data from the user are sent to the server. Data from the things board is transferred to the application and also user can view it separately. Figure.8 gives the Application Sign UP and Sign IN process in Mobile.

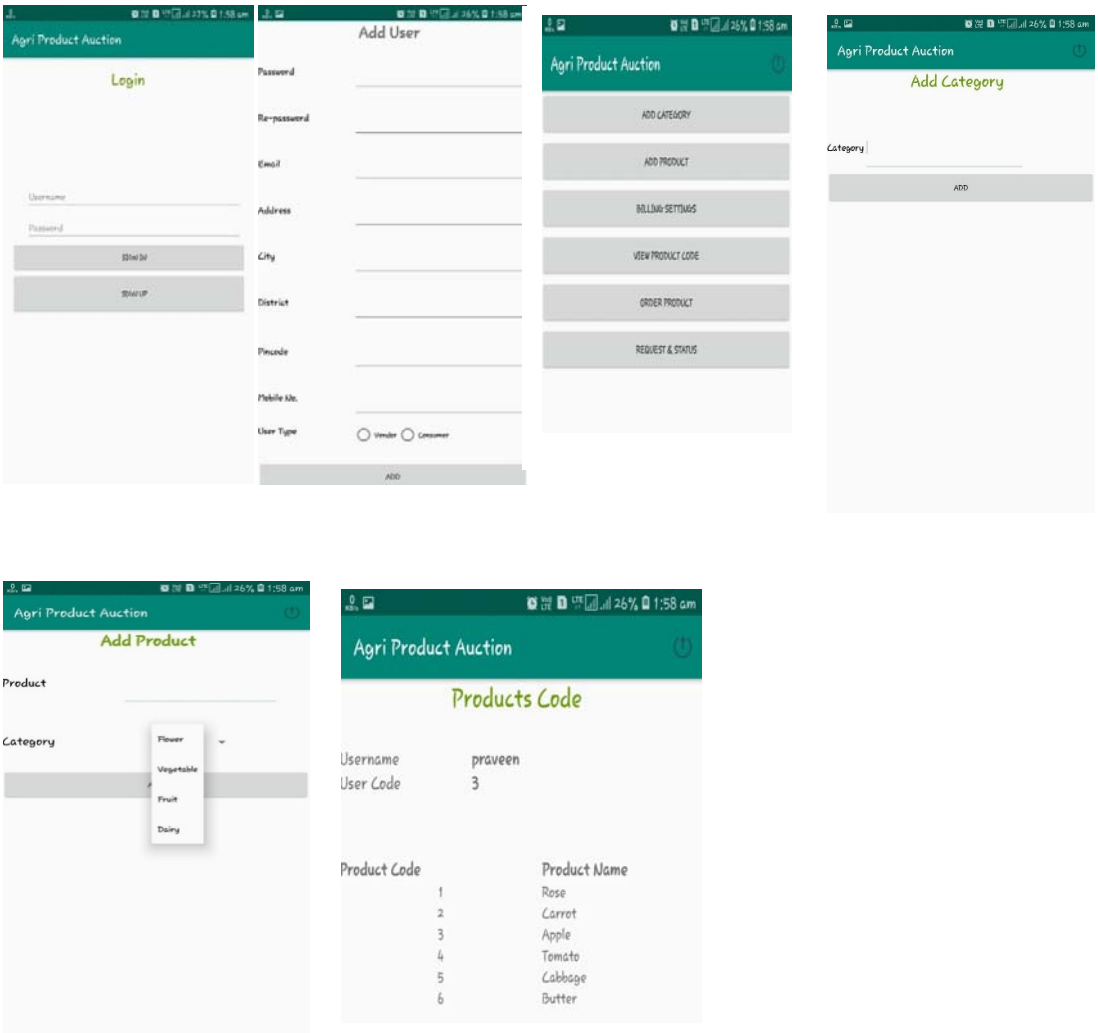

Figure.8 Application Sign UP and Sign IN process in Mobile.

Agri Production Auction is shown in Figure.9. Product Auction and Request status is given in Figure.10.

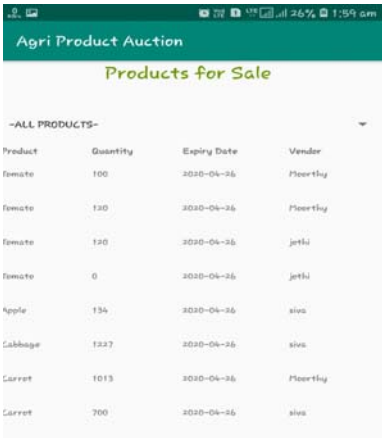

Figure.9 Agri Production Auction

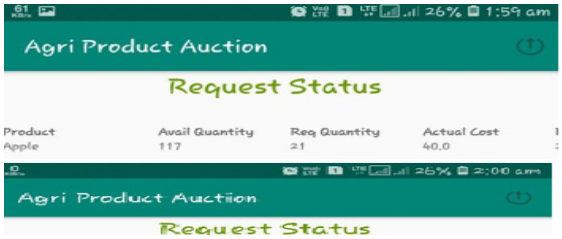

Figure.9. Agri Production Auction

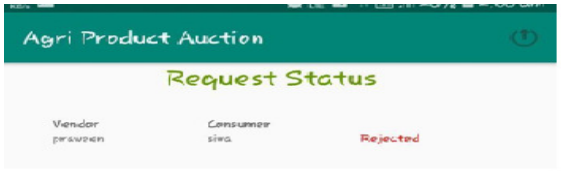

Figure.10 Product Auction and Request status.

7. Hardware Implementation

The Intellectual Weighing System has been designed and implemented. Figure 11 shows the hardware set up of Intellectual Weigh Machine.

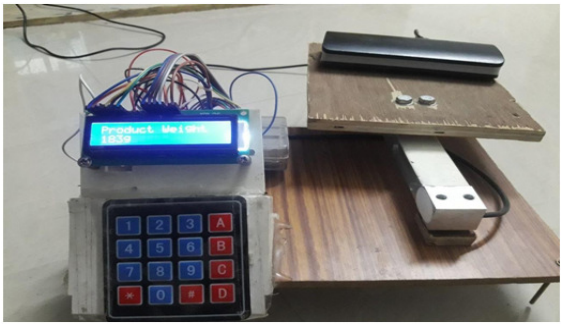

Figure 11. Hardware set up of Intellectual Weigh Machine

8. Conclusion and Future Scope

The design of Cloud-Based Agriculture Marketing System for agriculture is presented as a new method to improve automation in agriculture. This solution is given by providing internet as a communication channel. This project enhances the information flow between farmers and their buyers bymeans of providing direct communication between farmers and buyers directly without any intermediaries. By the implementation of this project both the farmer and buyer are more benefitted without any intermediaries and also avoid delays in delivery of agricultural product. It also avoids more demand in market to raise the price of the product unnecessarily which is done by intermediaries against government norms.

In future, this project will be expanded for all variety of farming products and the farmers can sell their products directly with buyers**.** And also, it makes a way for farmers to sell their product directly to the common people who require more quantity with quality continuously within the time period. It is done by arranging a transport facilitate for export agricultural goods by a group of farmers and group of vendors within a geographical area where similar crops are cultivated within a period of time. This project helps the countries like India whose agricultural land are in highly dense geographical area with natural challenges like hills, forest etc. In this project the type of communication with transportation is more important and efficient to sell and transport the agricultural products.

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