

Automatic banana hands bunches measuring & recording Systems

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Abstract -In the era of electronics, farmer usable equipment's are remained undeveloped. In the area of Jalgaon city, banana cutting equipment's are necessary for avoiding the manual errors. Even now a days, peoples/farmers are using the manual technique for banana bunches measuring. We are trying to reduce the manual process by developing the measuring equipment for banana bunches through which we can perform its measurement accurately without manual error. In this proposed system, we have to design the automatic load cell based weighing machine which stores the many reading for continuous measuring process. The measured readings may be accumulated and finally the cost of total sold banana will be automatically calculated. For this final calculation, system has to consider daily varying rate with difference rate specifically assigned for banana. Final amount can be displayed on display attached to load cell. Load cell based weighing machines are available in market for general purpose use but we tried to design specific weighing machine which performs the continuous measuring and accumulating facility for specially banana bunches counting. This system includes the load cell sensor, data acquisition system, processor system, keyboard system and display system. ARM 11 is specifically decided to use for high speed computation.

Keywords -RTOS, ARM Processor, Load cell sensor

I. INTRODUCTION

Agriculture sector plays an important role but development in agriculture sector is very slow. Hence, So we are trying to developing a system which will help to farmers at their own place. Jalgaon city is famous for banana production. Most of the farmers are producing the bananas in their own farms. They are producing bananas but they are totally dependent on the agents for the sale of bananas[1]. The agent generally brings the balance for the measurement of bananas. Mostly it is made faulty so that less weight can be measured by agents. They are using manual method for noting down the reading on balance. A person who is noting down the measurements are also does manual error extensionally. Finally there is loss of farmers only. No one is looking towards this problem of farmers. Electronic balances are available but even needed to manually record the reading. To reduce the manually error extensionally made by agents, there should be development of electronic balance which can record all the bananas readings automatically without any manual interference. Once recorded, it should not be deleted in any condition so that farmers can get real data of banana bunches recordings. Rate and difference are the two measuring parameters for banana measure. Accordingly final amount is calculated by agent. This should be also automatic. Continuous measuring until end is needed with final calculation of amount of sold banana bunches.

II. PREVIOUS PROBLEM

Most of the farmers are producing the bananas in their own farms. They are producing bananas but they are totally dependent on the agents for the sale of bananas. The agent generally brings the balance for the measurement of bananas. Mostly it is made faulty so that less weight can be measured by agents. They are using manual method for noting down the reading on balance. Manual error present in the measurement and selling of banana bunches is the main problem. To develop systems which can continuously measures and records the

measurements that will accumulates it at last and that will calculate final cost is needed[2].

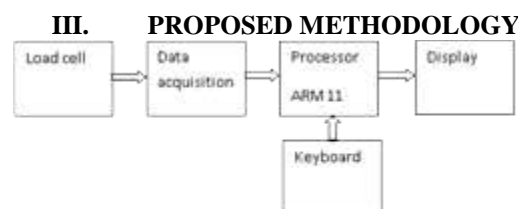


Fig.3.1 Block Diagram Of Proposed Technology

Our proposed system has extension includes with hardware and software design for the automatic weighing scale for a particular purpose of banana bunches measuring and recording. Hardware is taken out based on ARM 11 processor. It can be used for fast processing as it involves features and it was used by many authors for the real time dedicated systems. Processor can easily work for immediate modification in hardware and software. The advantage of this system is that need of technical development, in agriculture field is for the automatic weighing scale for the purpose of banana bunches measuring and recording the readings & calculations .which can save time and manual errors[3].

Which are present in the measurements and selling of banana bunches also minimize a manual error for the benefit of farmers is the main function in this occupation. To progress systems which can continuously measures and records the measurements that will accumulates it at last and that will calculate final cost is needed in a long run for the general public. The methods has came up with a new way to weighing techniques for the banana bunches. it is possible to implement this such invention into other applications such as in oranges weighing ,cotton weighing, Once the electronic devices has been evince to be working, it is possible to implement this automatic banana bunches measuring and recording methods

towards other applications. to create the weighing of the all type of agricultural fruits is done automatically[4].

Proposed system can include a design and development of automatic load cell based weighing machine for specific task of banana bunches selling. There are about 3000 to 10000 bunches of bananas in farm to be sold at a time. It is needed to sell in particular time. No delay is allowed as banana may be ripened after that day so immediate selling and sending to market is necessary. Fast, accurate and reliable system is needed for selling purpose. All bunches are generally measured one by one and put in to the trucks (with manual process previously). Continuous measuring and adding of all bunches of banana without manual method leads to add new feature in available weighing machines. The machine to be developed should calculate total weight with total cost. It should ask for input rate and difference of that day. It should show the total count for banana bunches with total weight until last banana bunch. Finally cost calculation should be performed for getting amount from agent. Final amount can be displayed on display attached to load cell. Modification has to do in already available load sell so that it will work as per our use for banana bunch measurement[5]. In market, many weighing machines are available with various specifications but the features of automatic measuring, accumulating and cost calculating as per banana measuring standard are not available in them so need to develop it.

Required Tools

- Load Sensor circuit.
- Embedded system.
- HDMI display
- Data acquisition system

IV. HARDWARE DESCRIPTION

A. Sensing Circuit (HX711)

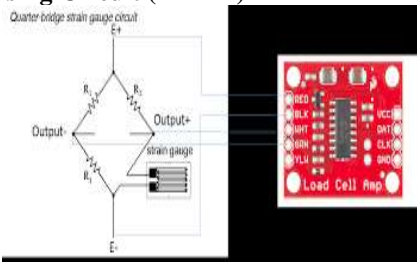


Fig4.1 connection of Sensing Circuit (HX711)

Sensing circuit consist of Load cell sensor having weighing and calibration sensing capability. It is constructed by analog conditioning and analog to digital serial device. Serially information may be connected to processor. HX711 is the combined sensing device which can send the weighing as well as calibration data serially. Table 1 shows the pinout of the HX711 sensor[6].

Pin	Name	Description
E+	red	Excitation+ or VCC
E-	black	Excitation- or GND
A-	green	A-, S-, or O-
A+	white	Amplifier+, Signal+, Output+

Table 1: Pinout connection of the HX711 sensor

B. ARM 11 Rpi Processor

ARM processor operates at 700 MHz & it's 512 MB RAM. It consumes 5V electricity at 1A current as a result of that which power consumption of raspberry pi is less. It has many peripherals such as USB port, 10/100 ethernet, GPIO, HDMI & composite video outputs and SD card slot is employed to attach the SD card that contains raspberry Linux package. Figure 4.2 shows the block diagram of Raspberry Pi.

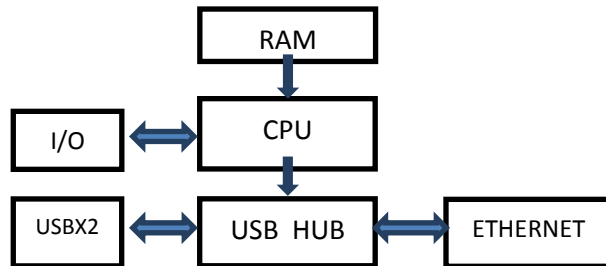


Fig 4.2 Block Diagram Of Raspberry Pi

1. SoC: BROADCOM BCM 2835 is defined as System on chip.
2. CPU core: ARM1176JZF-S, ARM11 core clocked at 700MHz; ARM VFP. The ARM11 core implements the ARMv6 design.
3. GPU core: a Broadcom Video Core IV GPU providing OpenGL es one.1, OpenGL es a pair of.0, hardware-accelerated Open VG one.1, Open EGL, Open max and 1080p30 H.264 high-profile decrypt. There square measure twenty four GFLOPS of general purpose calculate and a bunch of texture filtering and DMA infrastructure..
4. SD Card Slot is employed to put in OS/booting/long term storage. The total memory of the SD card is concerning 8GB[7].
5. small USB Power Port provides 700mA at 5A.
6. Audio out Digital audio is obtained if HDMI is employed to get stereo audio. Here analogue RCA association is used[8].

C. Data Acquisition System using Raspberry pi

An information acquisition system could be a assortment of software package and hardware that permits you to live or management physical characteristics of one thing within the globe[9]. a whole information acquisition system consists of DAQ hardware, sensors and actuators,

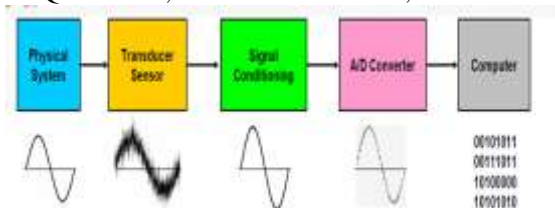


Fig4.3 Block Diagram of DAQ

signal acquisition hardware, and a laptop running DAQ software system. information acquisition system to live totally different properties depends on the sensors that are suited to observe those properties. Signal acquisition is also necessary if the signal from the transducer isn't appropriate for the DAQ

hardware getting used. The signal may have to be filtered or amplified [10].

V. SOFTWARE DEVELOPMENT

Some specific Software Libraries are required for the development the Python codes for this application. Initially we will discuss about the Libraries installation process and then we will see the code development process[11].

A. Python

Python is a widely used general-purpose, high-level programming language. Its design philosophy emphasizes concepts in fewer lines of code than would be code readability, and its syntax permits programmers to specific possible in languages like C++ or Java. The language provides constructs intended to enable clear programs on both a small and large scale.

B. Steps to Install Raspbian OS

In order to install Raspbian OS, first next out of box software (NOOBS) has installed. first select Raspbian Wheezy software .

1. First step is to allocate the drive for installing OS
2. SD adaptor can also be abuse for this reason.
3. Transfer WINDISK 32 utility from source forge Project which is a zip file.
4. choose and run the zip file
5. Select the file and click run as administrator
6. Select the image file which was extracted above
7. Select the drive letter of the SD card in the device box.

C. Software Library Install

Python codes for both the modules are developed as per the requirements. For running this code the different libraries are required to install. To install the Python library on Raspberry Pi, we first need a few dependencies[12]. Next, to install the library execute, copy Code as follows and sum in command prompt on Rpi.

```
sudo apt-get upgrade  
sudo apt-get install build-essential python-dev
```

```
sudo python setup.py install
```

This should compile the code for the library and install it on Rpi device so any Python program can access the Adafruit_HX711 python module[13].

First navigate to the examples folder by executing:
`cd examples`

Now to run the example on a Raspberry Pi with an Load cell sensor connected to GPIO #4, execute the

```
sudo python ok_scale_test_ras.py
```

Make sure to run the command as root with the sudo command as shown above. After the program executes, you should see both the rate and difference of banana weighing displayed once. Program will run.

start banana count and add a banana bunch on platform[14].to calibrate or zero set for existing weight. for counting a banana bunch, it has to place on the load cell, and every time the weight is added with previous weight and displayed.if you want to end the counting, press both the buttons for more than 5 sec. it will display the total weight with total cost by calculating using rate and difference specified already[15].

D. Algorithm

- 1) Initialize the load cell sensor, keyboard and raspberry circuit.
- 2) When the weight of banana is calibrated by load cell sensor, it reads the unique digital code of the raspberry Pi module..
- 3) Display weight on HDMI screen. Stores the weighing data in database with date and time.
- 4) rate and difference is multiplies with weight of banana.
- 5) Repeat the process from step 2) to step 5) for other persons with corresponding banana bunches .

E. Algorithm Explanation

load cell sensor, keyboard and raspberry circuit. Weighing is send by load cell , it required proper calibration & reset, before new weighing. when the load cell sensor reads the weight of banana it display weight on HDMI screen and store the data in data base file. At that time calculate the total cost. by rate and difference is multiplies with weights of banana. And repeat all these process other bunches of banana.

VI. RESULT & DISCUSSION



Fig6.1 Final Proposed weighing & measuring System

In this section we provide the detailed results of the experiments carried out using the proposed System. The following monitoring results are obtained using load sensor. These real time monitoring results are recorded on memory. An RTOS platform based digital weighing systems has been designed to enhance the measuring capabilities of banana weight. For checking accuracy and reliability, the system has been checked by using a calibrated weights and it was found that the system giving us a exact throughput with high precision. Table 2 shows the weight of banana & output voltage obtain across the HX711 sensor.

The same measurement has been taken through digital system and we got very precise result. The system shows accurate reading for applied weight with the precision up to three decimal point like if we measure an ideal weight of 5Kg on the designed scale it shows a perfect reading of 4.998 Kg on digital display board.

develops systems which can continuously measure and record the measurements of banana bunches that will accumulate it at last and that will calculate final cost is needed in a long run for the general farmer

Sr.no	Weight at weigh scale (Kg)	Analog output by load cell (mV)
1.	1 Kg	1.979 mV
2.	2 Kg	3.957 mV
3.	10 Kg	19.79 mV
4.	20 Kg	39.56mV
5.	30Kg	59.38mV

Table 2 Weight of banana & output voltage across load cell

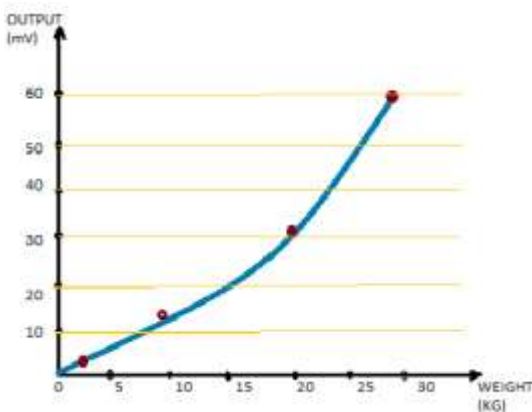


Fig.2 Graphical representation of Weight & output voltage

Simulation results for RTOS as well as HDMI display are as shown in following figure 6.2 and system result in figure 6.3 shown below. The micro python code is loaded and result is displayed on HDMI display shown below.

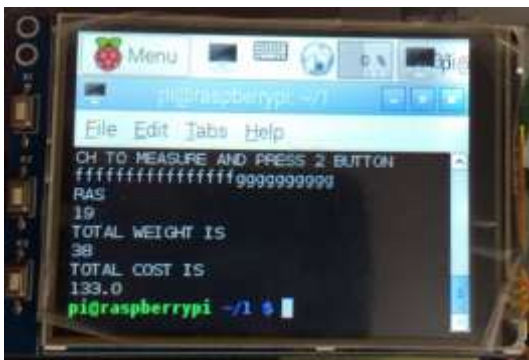


Fig.3 python code captured final result of system

VII. FUTURE SCOPE

In the era of electronics, farmer usable equipments are remained undeveloped. In the area of Jalgaon city, banana cutting equipments are necessary for avoiding the manual errors. Even now a days, people/farmers are using the manual technique for banana bunches measuring. We are trying to reduce the manual process by developing the measuring equipment for banana bunches through which we can perform its measurement accurately without manual error. In this proposed system, we have to design the automatic load cell based weighing machine which stores the many reading for continuous measuring process. The measured readings may be accumulated and finally the cost of total sold banana will be

automatically calculated. For this final calculation, system has to consider daily varying rate with difference rate specifically assigned for banana. Final amount can be displayed on display attached to load cell. Load cell based weighing machines are available in market for general purpose use but we tried to design specific weighing machine which performs the continuous measuring and accumulating facility for specially banana bunches counting. This system includes the load cell sensor, data acquisition system, processor system, keyboard system and display system. ARM 11 is specifically decided to use for high speed computation.

VIII. CONCLUSION

We have designed the system with which we can perform the banana bunches measurement specially based on the "rate and difference" generally used by suppliers in Jalgaon district. If the average weight is more than the specified weight, then the difference amount is added per bunch in total amount. This is automatically calculated with our system. Specific problem of manual error and intentionally made weight error for more profit by the market agent is totally solved by the designed system which does not allow to any manual interference in the measurement and calculation of banana cost.

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