Low Cost Dairy Management System Using PIC Microcontroller

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ABSTRACT: *Milk production in India is quadrupled in last 40 years and India is largest milk production country in the worlds. In India milk collected from farmer by dairy. Mostly all dairies are cooperative based and small scale. Therefore dairies are unable to spend expenditure on automated milk collection system using PC and software which is available in market. The proposed system make complete automation of milk collection system using PIC controller (PIC 16F 877A). The heart of system is PIC controller which replaces PC in conventional one. Due to PIC controller speed of operation increases, it helps to save time. In proposed system thermal printer is used for printing instead of the older bulkier one, and it not requires ink for printing mechanism as well as the thermal printer prints faster than the conventional printer. The system size is compact like portable device. Due to its simplicity it is more useful in villages, as there is no need of technical operator, farmers can also handle it properly.*

Keyword : *PIC Programmable Interface Controller , ADC Analog to Digital Conversion, PC personnel computer*

1. INTRODUCTION

The gross production of milk in 2015-16 was 155.5 million tons. This mass production is achieved by farmer. The table 1 shows drastic change in milk production in India. The majority of farmers are illiterate or semi literate and they run very small scale cooperative dairies. Agriculture based 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.

Existing system: The Milk is get collected by Farmers at the Milk Collection Centers. The unique identity number provided to each farmer by dairy. After entering unique identity number a sample of milk is taken by farmer for evaluation of the FAT and temperature of the milk. Quantity of milk measured with help of weighing scale which is connected to PC. According to quality and quantity of milk the rate of milk is decided by the software automatically. The information is stored in the PC and operator take prints for farmer. For operating such type of milk collection system, require educated operator. In this system the cost of milk collection is high.

Table 1 Milk Production in India

Year	Production(Million Tones)
1970-71	22
1991-92	55.6
2001-02	84.4
2009-10	112
2012-13	132.4
2013-14	137.7
2014-15	146.3
2015-16	155.5

Source: The National Dairy Development Board

We propose system it will make this collection, billing process of milk from farmer to dairy more faster, reliable, accurate and expensive. In proposed system we suggested to use PIC microcontroller for processing and calculating bill. As well as thermal printer is used for printing because this printer having small in size and low cost. Load cell is interfaced with controller for measuring the milk. Also FAT machine is interface serially to controller. A proposed system is user friendly and ease to handle by farmer.

Ankit V. Shingle andR. R. Sedamkar [1] propose paper on Raw Milk Collection using POS (Point of Sale) and GPRS Technology**.** In this paper they have considered of using Electronic Weighing Scale, POS, Real time tracking, GPRS, GPS systems. This paper deals with Raw Milk Collection using POS (Point of Sale) and GPRS Technology.

Snehal Jadhav, Dr. Janardan Chitode, Mr. Samir Phutane [2] propose system which is Design and Implementation of Raw Milk Reception Dock System. The proposed system provides the design and implementation of Raw Milk Reception Dock (RMRD). The

primary point of liquid milk entry in dairies is Raw Milk Reception Dock. It is basically used for the reception of milk and keeping record of incoming milk by tanker using automation.

2. PROPOSED SYSTEM

The proposed system is based on the embedded technology. Embedded system is a combination of hardware and software. Also it is low power device. The system can be minimized by the design engineers that reduce the cost and also the size of the product as these systems are designed for the specific applications. The Proposed system having load cell for the weight measurement of milk, FAT machine checking quality of milk, thermal printer for printing bill of farmer; these all device interfaced with PIC microcontroller. The next section of this paper gives the description of general and the specified block diagram of the proposed system.
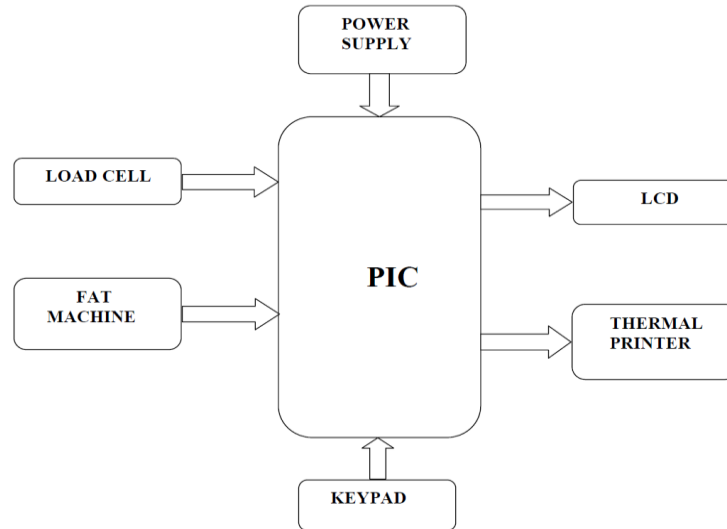

Fig. 1 Proposed System Block Diagram

2.1 PIC Programmable Interface Controller

The PIC Controller will replace Conventional Computer which will reduce cost, size of the system also it portable as it is small in size. PIC is a heart of proposed system. All inputs and outputs device connected to the PIC. PIC takes quantity and quality of milk from load cell and FAT machine respectively and it calculate total amount of milk. Total amount print by thermal printer. We have use PIC 16F877A because it having in built 10 bit analog to Digital Convertor (ADC). It is a 40 pin IC which has RISC architecture because of this it only has 35 single word instruction set. Also it has 368 bytes of Data Memory RAM and 256 bytes EEPROM, it also has 8K of Flash Memory.

2.2 Weighing Scale

Weighing scale design consists of reading data from load cell. Load cell is a transducer which converts force applied to it into an electrical signal. This electrical signal is very small need to be amplifying. Then this amplified electrical signal will convert into digital form by ADC of PIC. Then this data is read by microcontroller and processed it and displays weight. Weight is converted into liter value.

2.3 FAT Machine

Quality of milk depends upon FAT. FAT means Fatty Acids. FAT machine check quality of milk and it display on machine itself. FAT machine connected with the PIC. The connection between FAT machine and PIC are through serial port. PIC can calculate total amount using value of quantity and quality of milk which is received from weighing scale and FAT machine. It is display on LCD.

2.4 Thermal Printer

Thermal printer prints the receipts of milk. We use a thermal printer because it produces a printed image by selectively heating coated thermo chromic Paper or thermal paper, when the paper passes over the thermal print head. The coating turns black in the areas where it is heated, producing an image. Two-color direct thermal printers can print both black and an additional color (often red) by applying heat at two different temperatures.

Here we can save data of farmer using Keypad. We interface key pad with PIC.

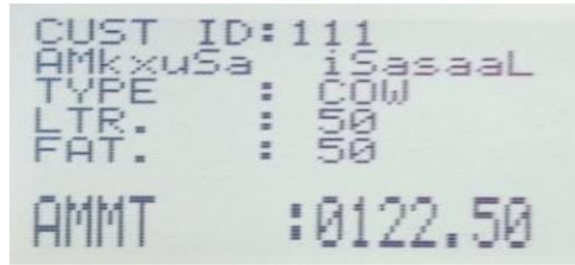## 3.0 PROTOTYPE RESULT AND SYSTEM IMPLIMENTATION

Fig. 2 Customer receipt

The figure 2 show the receipt of customer. It having customer identity number, milk type, quantity of milk ant FAT of milk. Above receipt shows quantity of milk are 5 liter not 50 liter. '0' shows fraction. It is same for FAT. Figure 3 shows prototype system.
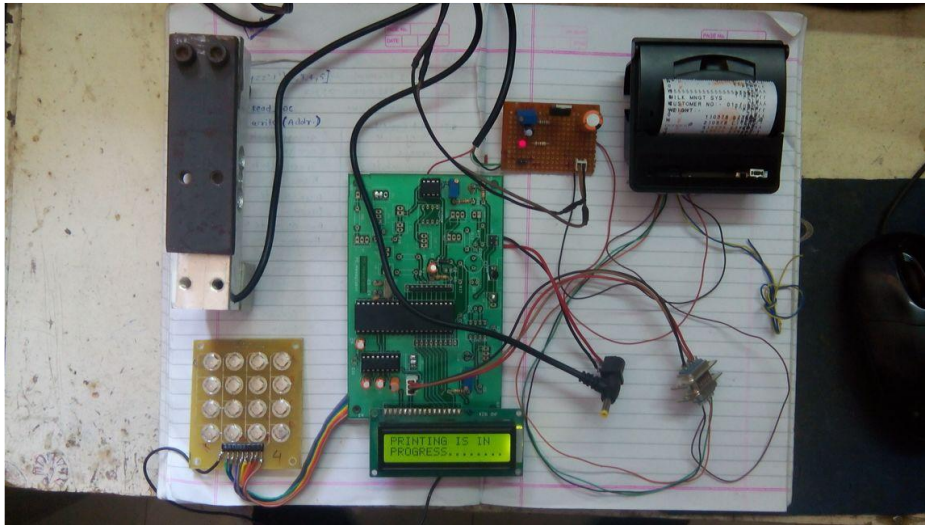

Fig. 3 Prototype System

3.0 CONCLUSION

Low cost dairy management system presented cost effective and highly portable milk collection system using single chip. This system does not require technical operator. As we are using thermal printer instead of conventional one which print more quietly, consumes less power & requires low maintenance. It is easy to handle & also portable. It requires less space for installation as compared to conventional systems. The prototype system tested and it work smoothly.

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