

DEVELOPING DATA PROCESSING SYSTEM FOR DAIRY AUTOMATION

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ABSTRACT

India is largest country for milk production, because most of the farmers take more interest in dairy industry. Due to this more number of co-operative dairies is formed in villages. Dairy consist of collecting, testing and rating of milk. In earlier days the process of testing of milk was done by measuring FAT, density, SNF, CLR and weight separately. So to measure each quantity is very time consuming and also all farmer has to stay in line for whole procedure. Hence the proposed system consists of design of automatic milk collection as well as billing process. The proposed work is based on embedded system that can perform different operations of dairy automation. Milk collection system gives checking milk analyzer output and extracts only required milk parameters. It also gives the immediate measurement of milk weight. The customer name along with date, time and milk information (FAT,Weight,Rate) is displayed on graphics LCD. Customer record is stored in external memory in the form of SD card as well as in pen drive. Then milk billing record of each customer is printed with the help of thermal printer. This process gives automatic billing.

Keywords: *CLR, Embedded system, FAT, GLCD, SNF.*

I. INTRODUCTION

Dairy consist of collecting, testing and rating of milk. In earlier days the process of testing of milk was done by measuring FAT, density, SNR, CLR and weight separately. So to measure each quantity is very time consuming and also all farmers has to stay in line for whole procedure. . In milk collection process all the measurements are noted and calculation is done manually which further lead to mistake or error occurs during calculation^[1]. Hence the proposed work includes automatic milk collection system. It is stand- alone system. With the help of this system efforts will reduce. Headache of record storage will also eliminate completely. As we know that the automation has increasing importance in order to reduce dependence of labour and liberating farmers from constant work. This system is generally design for dairy industry in villages. It is suitable for every dairy industry. The proposed system introduced registration of payment which is based on daily, weekly, monthly and yearly according to FAT and SNF content in milk. Along with this different deductions are also taken in to consideration. Based on these requirements it is decided to develop program that will display billing information with customers name on graphics LCD. For the data storage of customer's milk content and billing amount, interfacing of SD card and USB port with microcontroller is introduced.

1.1 Current systems and its limitations

- Current automation systems are huge in size.
- Available memory storage is not sufficient for storage of all customers' record.
- Present keypad and software is not user friendly, it requires skilled workers.
- The customer record is not available in receipt form or in soft copy form.
- Introduction of human errors during handling of milk analyzer device.

As per requirement there is need of Data processing Unit for dairy automation. From this need, some outcomes that are to be found out. This leads to the development of different modules. Out of which, first module consist of automatic milk collection and second module gives billing system.

1.2 Features of proposed system

- Payment is stored daily, weekly, monthly and yearly according to dairy rates.
- Various deductions are considered.
- Reduces time taken to measure milk quantity.
- Display all information along with customers name on Graphics liquid crystal display (GLCD) for dairy owner.
- It gives signal with the help of buzzer sound before printing roll is over.
- Interface SD card for data storage.
- Real Time Clock (RTC) for time determination between different operations.
- It sends daily summary of payment and milk parameters to customer through GSM.
- Display essential parameters on remote display.
- Data collection of near about 2000 members in one day (morning/evening).
- Categorisation of milk is done and stored separately.
- Reduces time taken to measure all parameters with help of measuring unitary.
- Display required parameters information of milk content on display unit.
- Interfacing with USB port.
- Interfacing with PS2 keyboard for customer's name entry.
- Interfacing with compact thermal printer for billing receipt.
- Buzzer is added to indicate the completion of milk collection process.
- Compatible to weighting machine, remote display, graphics LCD, SD card, GSM, PS2 keyboard, milk analyser, thermal printer and USB port.

II. DESIGN CONSIDERATION

There are different papers presented which gives us the detail information about milk analysis, processing, measurement of different contents of milk parameter and billing system. Initially the different milk parameters like fat, CLR, SNF, density, temperature etc. have been calculated by applying different methods^[2]. Each customer's record is manually recorded. So the proposed system consists of Automatic design of milk collection and billing system. This automation will give the improved and reliable milk collection and billing system.

As per requirement there is need of Data processing Unit for dairy automation. From this need, some outcomes that are to be found out. This leads to the development of different modules. The first module is checking the milk analyzer output and extracts only the necessary data from analyzer. Then second module gives developing immediate measurement of milk weight. Both this processes reduces time of milk collection. Depending upon the number of devices that are interfacing with controller, it is necessary to select the suitable microcontroller. For the data storage of customer's milk content and billing amount, interfacing of SD card with microcontroller is introduced^[3]. And then develop program for that interface.

Further by checking the compatibility of thermal printer, PS2 keyboard with controller program should be build up. After having the interfacing with each device the testing of every module and then overall system testing is done^[4].

III. BLOCK DIAGRAM

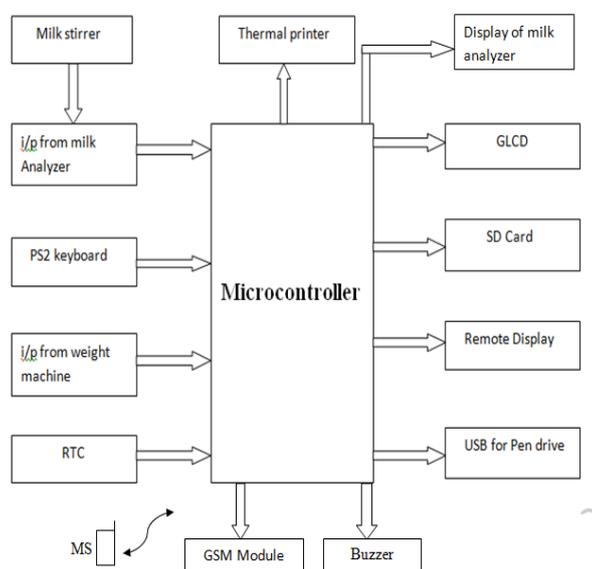


Fig. 1 System Block Diagram

The fig.1 shows block diagram of data processing unit. Milk stirrer system is used to stir milk equally, and this milk is used for analysis. The output of milk analyzer system is fat, SNF, CLR, sugar content, temperature, degree, etc. Only required parameters are extracted from it and all other parameters are ignored and displayed on remote display (only for dairy owner). It reduces time to measure milk quantity by using weighing machine. The accuracy of weighing machine is 0.03 per liter. The weight, Fat and price will be displayed on remote display for client^[5].

The customer data (name) and manually calculated values are entered through the PS/2 keyboard. It can store the payment register for daily, weekly, monthly and yearly, according to formula used to calculate FAT and SNF as per the rates. The SNF can be calculated by following formula-

$$\text{SNF} = (\text{CLR reading}/4) + (\text{Fat} \times 0.21) + 0.36$$

The Customer names along with date, time and milk information (fat, weight, rate etc.) is display on graphics LCD for dairy owner. All customer record is stored in external memory with the help of SD card. For the customer USB port has been given so that customer can take milk record in his pen drive.

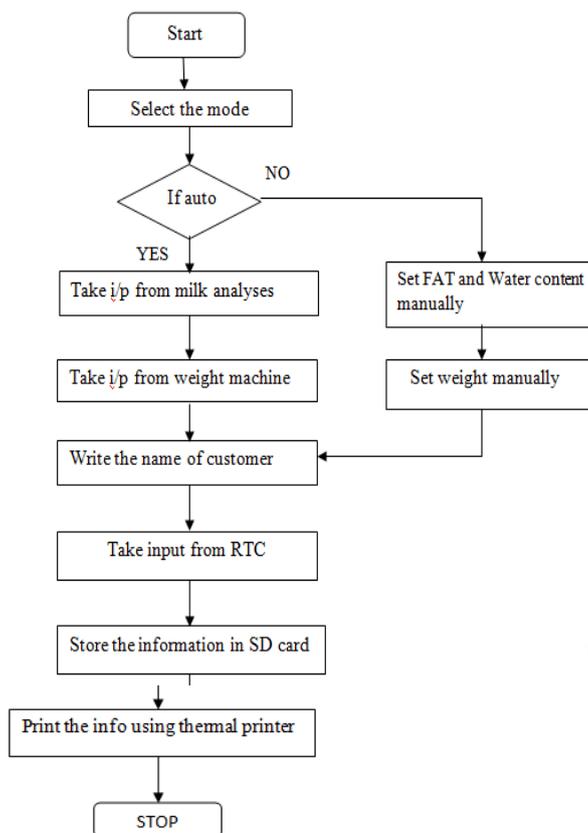


Fig. 2 Proposed system flow chart

Fig. 2 shows the flow chart of proposed work. The milk parameters are calculated in two modes. In auto mode, taking input from milk analyzer and weighing machine automatically. In second mode, entering milk parameter content and weight manually and further processing is done.

IV. RESULTS AND CONCLUSIONS

4.1 Results

The reading obtained from milk analyzer device that gives milk parameter as SNF, FAT and CLR is given in fig.3.

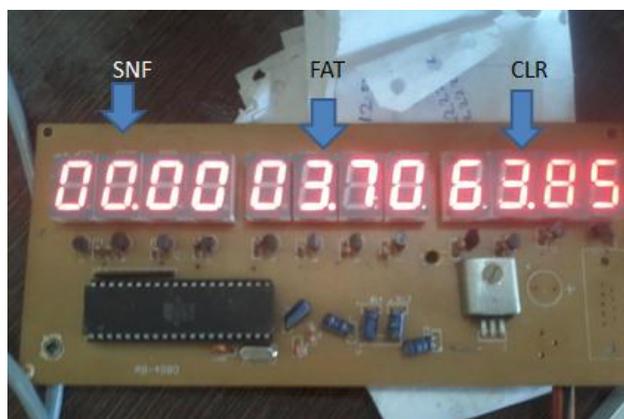


Fig. 3 Display unit of milk analyzer

Manual entry of customer’s name is entered through keyboard and displayed on GLCD as shown in fig.4.



Fig. 4 Interfacing keyboard and GLCD with pic

V. CONCLUSIONS

This is a low cost automatic milk analyzing and billing system. The accurate information about FAT, SNF &CLR content along with milk weight is displayed on remote display unit. The elimination of manual registers for all kinds of information is done with the help of keyboard. The headache of manual record storage of each customer is eliminated with SD card. The interfacing of controller with thermal printer gives the automation in billing process. Due to this, immediate payment of bill is possible.

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