

## TO DEVELOP DATA PROCESSING SYSTEM FOR DAIRY AUTOMATION

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### ABSTRACT

*Agriculture is a backbone of our country and dairy farming is a supplementary business of Indian farmers. 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 aim of this system is to reduce the efforts in record storage and calculation of large amount of data, because there is tremendous revolution in dairy industry. 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, PIC, PS2 keyboard, SD card, 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<sup>[1]</sup>. 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. Generally milk factors are manually calculated in dairy. So, the accuracy is decreased and time required for calculating the milk parameters gets increased. So the milk analyzer device is used. 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 as well as extracted parameters are displayed on remote display (only for dairy owner).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.

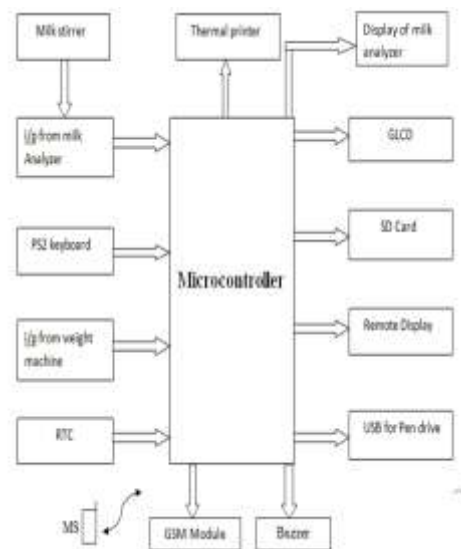
## II. DESIGN CONSIDERATION

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<sup>[2]</sup>. 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<sup>[3]</sup>. 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<sup>[4]</sup>. The program is developed by checking the compatibility of all peripherals with microcontroller.

### III. BLOCK DIAGRAM



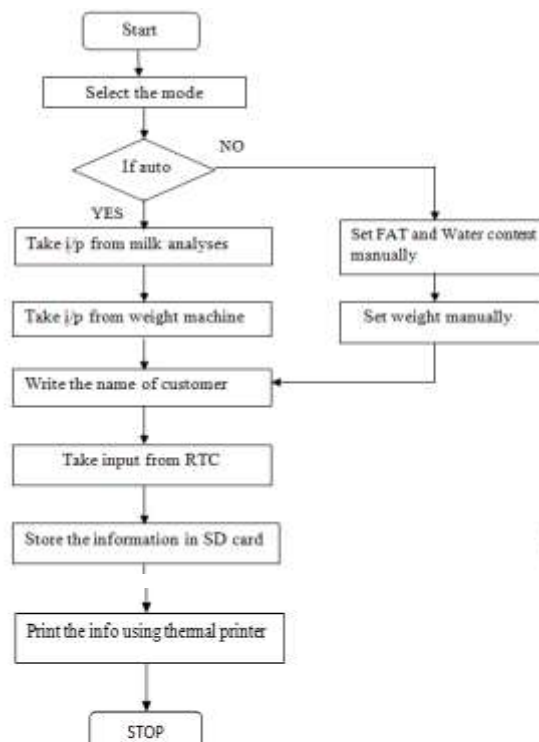
**Fig. 1 System Block Diagram**

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<sup>[5]</sup>.

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.



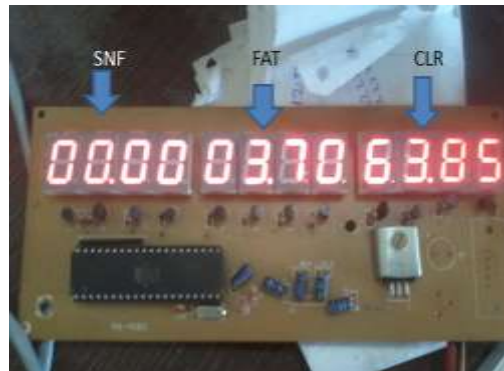
**Fig. 2 Proposed system flow chart**

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. This display unit extracts only required milk parameters out of different parameters. Depending upon this parameter reading, billing of milk is done.



**Fig. 3 Display unit of milk analyzer**

**Table1. Readings obtained from milk analyzer**

Parameter	Cow (in %)	Buffalo	Reading
CLR	87.2	60	63.85
SNF	12.8	6-12	8.85
FAT	4	0.5-12	3.70

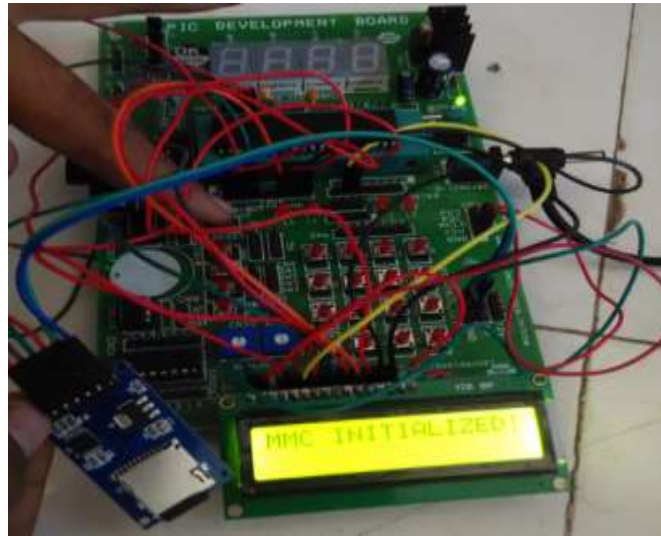
The table 1 shows reading of milk parameters like CLR, SNF and FAT. The categorization of milk is done in above table. The readings give parameters of buffalo milk. In above table average reading of CLR, SNF, FAT of ten samples is taken and displayed on seven segment display unit as shown in fig. 3.

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**

Whole customer record is stored in SD card. The SD card interfacing with PIC Microcontroller is shown in fig.5. The following figure gives initialization of SD card.



**Fig.5 Interfacing of SD card with PIC**

## 4.2 Conclusions

This paper gives a low cost automatic milk analyzing and billing system. The milk collection parameter such as FAT, CLR and SNF are measured by this system gives more accurate and less costly than available devices. Use of keyboard to enter the daily billing for a farmer makes it convenient for the dairy management and use of pen drive gives a farmer to keep account of the entries made for a month and beneficial to Indian farmer. The interfacing of controller with thermal printer gives elimination of manual registers and obtained automation in billing process. Due to this, immediate payment of bill is possible.

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