DESIGN OF MILK ANALYSIS USING EMBEDDED SYSTEM

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ABSTRACT

Abstract At present, the farming methods of animal husbandry'is relatively backward and its information level is low. This blocks the development of stockbreeding in our country. In order to change this situation, this paper designs an Android-based management system which applies to dairy farms. In this system, the mobile terminals are based on Android intelligent platform while this system is also designed close connection with the norms of the day-to-day operations of the field staffs. We integrate Wi-Fi, Two-dimensional bar code, data synchronization and other technologies to achieve information management in dairy farms, and to improve work efficiency as well as economic benefits of dairy farming enterprises. The design and application of this system can benefit stockbreeding's standardizations and information in our country and supply other domestic breeding industry with technical support This paper describes one of the applications of embedded system MILKOTESTER. It is Small compact, embedded in a single unit, requires less power and measure milk parameters like SNF

Keyword – *Lactometer,LM35,LDR,SNF,CLR.*

1. Introduction

The milk industry in India is a huge contributor to the income of a nation and this industry rests on the existence of cooperation that bring together dairy Farmers by combining their individual, small contributions. Most of these co-operations use a dual axis price fixing that is used to set the price of milk. But even at this age of technology, these establishments use old equipment's to get convenient and in most of the cases, wrong quality readings and thus the small dairy farmers are cheated out of their money because of this.
The farmers would be benefiting in the sense that they would get a just pricing and they cannot get cheated by the system, since manipulating it would be harder than manipulating a physical measuring scale. The industry would benefit because this can be used as a cheap alternative to the cost prohibitive and non-user friendly meters available abroad. This project would allow for an indigenous developed tool that can be used as a complete solution for this.

1.1 Exisiting System

German federal milk regulations.
However, the treatment also results in changes to further milk constituents, such as, for example, deactivation of enzymes inherent in milk. The heating conditions therefore have to be set in such a way that desired properties are achieved in the end product without undesired side effects being produced at the same time.Requirements of Milk and Milk-Based Products] (Milkregulation) of 24 Apr. 1995 [Dairy Law in the Federal Republic of Germany]. Pasteurisation, ultra-heat treatment (UHT) and sterilisation are recognised heat-treatment methods. Longtime heating, short-time heating and hightemperature heating are further differentiation criteria for pasteurised milk.The temperature/time ranges for the production of various types of milk are stipulated in Thermal treatment has a crucial effect on the quality and hygiene of food milk. The main aim of heat treatment is to kill pathogenic microorganisms or agents which cause spoilage.

2. System Analysis

2.1Methodology

As payment for the milk of farmer's are based on the quality of the milk which they delivered to the dairy and the quality is decided on Fat, SNF & Weight of milk. Since milk solids excluding fats cannot be

determined directly without the use of advanced spectroscopic techniques, we use an alternative to it. First we find the FAT content and the Specific Gravity (or the Corrected Lactometer Reading, shortened as CLR) of the milk and then find out the SNF content from a mathematical equation, called as the ―Richmond's Equation‖. Richmond's Equation:

Total solid % = CLR/4 +1.21F +0.14 SNF % = CLR/4 +0.21F+0.14.

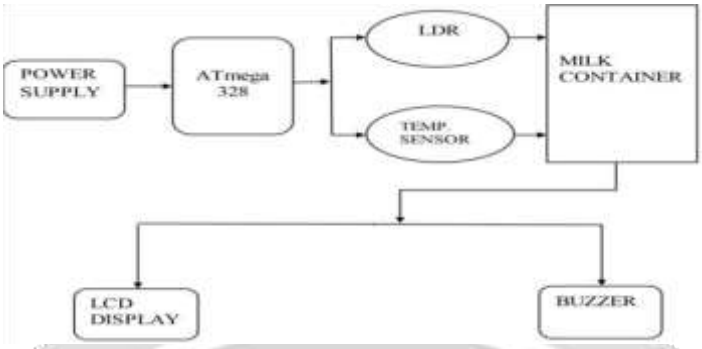

Fig-1: **Block Diagram**

2.2Hardware Requirementub

ATmega328- The high-performance Atmel pico Power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1024B EEPROM, 2KB SRAM, 23 general I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, a 6 channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. By executing powerful instructions in a single clock cycle,the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

Lactometer: Lactometer, a cylindrical vessel made by blowing a glass tube. One side of glass tube looks like a bulb with filled by mercury and another site is thin tube with scaled. For milk testing lactometer dipped in milk which we are testing. In lactometer the point up to which it sinks in the pure milk is marked after that put in water and marked at the point up to which it sinks in water. It sinks less in milk then water because as we know milk is denser then water. At lactometer there are to portions i.e. 'M 'and 'W' which is divided in three parts and marked as 3, 2 and 1. That indicates the level of the purity in Milk.

Here below some steps mentioned for milk testing –
Step 1- Whenever you want to test the milk purityArticle Search, you just put the instrument or lactometer in milk.
Step 2- If it sinks up to the mark 'M' which mentioned at lactometer that means milk is pure or if not that means milk is impure.
Step 3- If the milk is mixed in water then it would sink higher then marked 'M'.
Step4- If it stands at the mark 3 that means milk is 75% pure and respectively 2 for 50% purity and 1 means 25% purity.

LDR:- A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. There are many different symbols used to indicate a LDR, one of the most commonly used symbol is shown in the figure below. The arrow indicates light falling on it light dependent resistor works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity is increased when light is absorbed by the material. When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band. These photons in the incident light should have energy greater than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough

energy strikes on the device, more and more electrons are excited to the conduction band which results in large number ofcharge carriers. The result of this process is more and morecurrent starts flowing through the device when the circuit is closed and hence it is said that the resistance of the device has been decreased.

3. SYSTEM DESGINING

The task of the milk collection system is divided into stages: – Actual measurement of the fat content, the CLR and the weight of the total milk from a single frame. – Display of each measured quantity. – Calculations:

• Calculate the SNF content from formula, using values of the fat content and CLR Reading. • Calculate the amount to be paid to the farmer using the value of SNF calculated and the quantity of the milk. – Store the results for each farmer on a memory as well as smart issued to the farmer. In order to appreciate the performance and functionality of the 'Milkotester' and'AutoCLR' it will be enlightening to have a brief insight into the manual methods of measuring fat content and CLR along with the working of our electronic equipment .

A. Milkotester

: An instrument to measure fat in milk using the opto-electronic principle is popularly referred as the 'Milkotester'.

B. Principle of Working Milkotester:

The scattering of a beam of light by the fat globules present in the homogenized milk is the principle in the Milkotester. The amount of light scattered by the milk sample is a measure of the fat content in the milk.

C. Construction:

A high intensity LED is used as a light source. The light beam is made to pass through the sample solution contained in the test tube. A LDR is placed exactly on the opposite side of the test tube to detect the amount of light passing through the test tube unscattered.To obtain maximum sensithe test tube is covered in wooden shield which has opening only for LED and LDR to pass through.

D. Working:

This solution is then made to pass through a syringe needle to disperse the fat globules homogeneously throughout the sample the solution. Then this sample solution is introduced in the test tube and beam of light is passed through it. The more the fat content in the milk, more will be the amount of light scattered by the sample. Thus the light reaching the LDR will vary with the fat in the milk, thus the change in the resistance of LDR is indication of the fat content .The circuit is calibrated using standards with sample of known fat values .The voltages are also adjusted within a range suitable for the MUX following this circuitry. The range of fat content acceptable to the market is fixed by the government to ensure the customer of the nutrition value of the milk. • For cow's milk fat should be in range of 3.5 to 4.5 percent. • For buffalo's it is 6-7 percent. Thus it is possible to incorporate a program in the microcontroller to give the alarm for the milk which doesn't fall in these ranges and so milk is rejected .This would also need a selector switch to enable the microcontroller to know whether it is cow or buffalo milk [4].

E.Auto CLR:

The specific gravity of the milk is measured using a 'Lactometer' and the temperature deviation of milk is taken into consideration and correction applied, the lactometer is called Correct Lactometer Reading (CLR). The Auto CLR is an instrument incorporating electronics to observe the lactometer reading .It is a patented instrument of its manufacturer 'Solid State Technologies'. In this case the manual process is preserved, only electronics is 'added' to it make observation error free and apply the temperature correction automatically. F. Construction: A 120 ml cylinder is used to contain the milk sample .The lactometer is suspended in the freely tivity

F. Construction:

A 120 ml cylinder is used to contain the milk sample .The lactometer is suspended in the freely movable and vertically arranged cylinder. The original position of lactometer is obtained by taking water in the cylinder and allowing the lactometer to attain a undisturbed position in which it shows '0' on the scale. G. Working: Take 120 ml of milk is in cylinder. The lactometer moves in a vertical direction and attains a fixed floating position. The lactometer reading is calibrated on scale on lactometer itself .The reading on the lactometer corresponding to the level of the milk gives the lactometer reading. But in Auto CLR we measure this vertical movement electronically. The upper tip of the lactometer is attached to the float of the type is used in motorcycles to indicate fuel level. This float moves vertically along with motion of lactometer .Using a strain gauge attached to the float, the resistance change is calibrated as a measure of the lactometer reading [5]

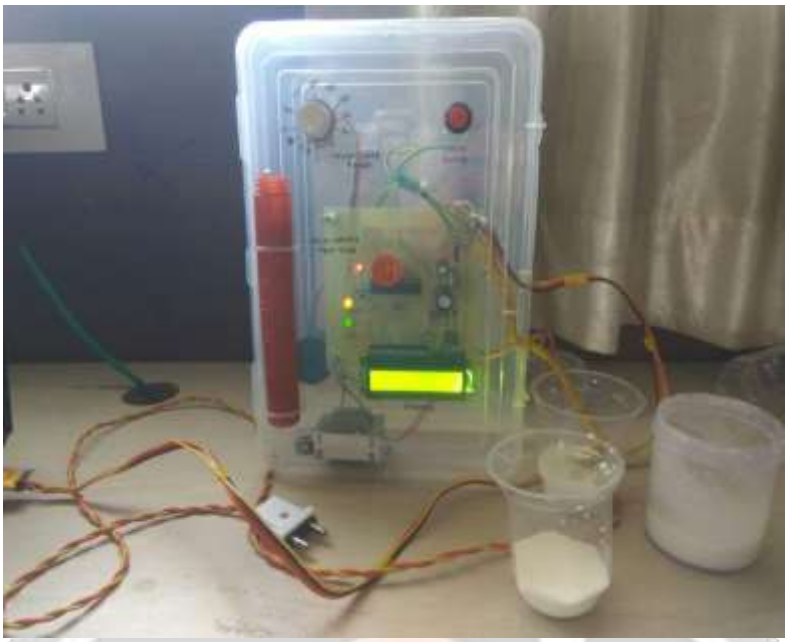

Fig-2: -**Project Demo**

Fig -2:- **Visual Basic Software For Displaying Various Milk Parameter's**

4. CONCLUSIONS

Farmers were the main beneficiaries of this project. The main benefits of the automatic milk collection systems as compared to the conventional methods are as follows: – Immediate payment for the milk delivered; – Accurate information about the fat content, quantity of milk and the payment due to the farmer is displayed; – Accuracy in weighing the milk on the MWS as against the manual process where milk was weighed using measuring containers which very often led to a financial loss to farmers; – Immediate testing of the quality of milk as against testing after 2 to 3 hours of collection; – The card reader unit ensures speed of operation and an error-free entry of identification number of the farmer; – The elimination of manual registers for all kinds of information and data storage.

5. ACKNOWLEDGEMENT

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