IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Issue-5, May 2019 E-ISSN: 2347-2693

Dairy Farming System

Mitali Sirdeshpande[1*], Sofiya Shikalgar[2], Vijeta Vipin[3], V.K.Bairagi[4]

[1,2,2,4] Department of Electronics and Telecommunication, AISSMS Institute of Information Technology, Savitribai Phule Pune University, Pune, India

[*]*Corresponding Author: mitu.sirdeshpande@gmail.com , Tel.: +9 -90212-97390*

DOI: https://doi.org/10.26438/ijcse/v7i5.631635 | Available online at: www.ijcseonline.org

Accepted: 18/May/2019, Published: 31/May/2019

Abstract— The beneficial nutrients obtained from milk to the human body needs no introduction. But the same is at stake nowadays due to addition of harmful ingredients being added in the milk by the milk suppliers as a result of their ever increasing greed for earning money. The recent advancements in science have helped a lot to rectify and remove such kind of impurity through various analytical techniques that qualitatively and quantitatively measure the impurities. Milk is a highly perishable product thus it is beneficial if this milk is test well in advance rather than its test that is carried out in the laboratory as it is a very time consuming process. With this approach we propose a new system that will quantify the milk parameters electronically. In this project we are developing an automated milk parameter monitoring system, along with maintaining the database of the milk suppliers with their supplied milk's parameters. This work is carried out by ARM microcontroller, here ARM controller collect data from fat sensor, pH sensor and load cell. The LCD will display this information with farmer's name, send SMS on weighing is done and finally upload this data on web portal.

Keywords—Automated milk parameter monitoring, Milk fat, Photometric, pH sensor.

I. INTRODUCTION

In dairy plants all farmers bring milk for selling it to dairy. In this process milk price depends on fat contents in the milk/lit, more be the fats, more be the price. Due to this reason there is huge level of corruption in dairy plant. Thus to avoid the corruption in dairy plant and improve the quality and service of dairy plant we develop this system. This system also gives detail information of each farmer including amount of milk with fat content on web portal, this information is also send to the chairman of dairy plant through GSM. In this system, milk fat, pH and quantity is measured and all data with farmer name and identification is send to web portal and message to particular farmer. In recent years there is a substantial increase in milk production in India. Maximum people of thickly populated India live in villages. Majority of them are involved in agriculture. The cattle animal is correlated with agriculture in India as the old method of cultivation is still vogue here. Rearing of cattle animal is also an additional source of income of the villagers in our country. India's progress as a country is highly dependent on the growth of its rural areas. This is where technology can help to a great extent by providing right solutions to empower the rural economy. It is only recently that automation has been introduced into agriculture. Embedded Technology is now in its prime and the amount of knowledge available is mind-blowing. An embedded system can be defined as a control system or computer system designed to perform a specific task. Embedded systems are playing important roles in our lives every day, even though they might not be visible. The nutritional value of milk to human health needs no introduction. The greed for money has pushed vendors to the extent of producing synthetic milk which has no nutritional content. Milk being highly perishable product, it is desirable to test it at the earliest opportunity rather than taking it to laboratory for analysis. This proposed system will help the farmers to get fair price for their supplied milk only after proper monitoring of their supplied milk parameters, and maintaining the database of the same for further reference and use will be beneficial.

Rest of the paper is organized as follows, Section I contains the introduction of necessity of milk parameters monitoring, Section II contain the related work of methods used for analysing milk and the need to do so, Section III methodology used for analysing milk parameters, Section IV contain the proposed system block diagram and architecture, Section V describes results and discussion, Section VI describes results and discussion, Section VII concludes research work with future directions.

II. RELATED WORK

In reference [1], the authors talks about how the quality of milk is being degraded and how the market of milk is being run by the dairy people. The system senses or discovers the

hidden constitutes of the milk which is not good for human health. It also sees that quality of milk is abandon and to be true with costumer and not play with their health. It talks about adulteration of milk and adulterant products being added to the milk. The system is more of chemical base. It detects the amount of urea, sodium chloride, sugar is being added. The system also measures the pH level, which is an important parameter to check quality or grade of milk. It helps to know for which purpose the milk can be used in a more useful way. The system uses to detect the milk which is being mixed with extraneous materials and illicit substitution of the substance with some other substance. The system uses expensive Teflon sheets for finding the quantity or amount of urea added in the milk.

In reference [2], research states, Urea is most common and existing matter in the milk. Most of the adulteration in the milk is based on urea. The research aims on the way desires for more money has made the vendors make artificial milk. Milk and milk products are kind of substances which cannot be kept for a long time they are short- lived and they starts getting decompose and decay quickly after a certain amount of time and it also need to be provided with proper temperature to keep it for a long time and the consumer can use it before it start decomposition. The research talks about average composition of whole raw milk. It also discussed how the demand of milk and its products are increasing day by day. Since, composition of high urea is a menace to human health. Urea is added to increase the SNF value. The system helps in finding out the amount of urea being added. The system uses chemical and traditional techniques to find the amount of urea mixed in the milk and the process involves giving out ammonia gases which is another harmful gas and it is not good for the workers or the labours and people working in that environment.

In reference [3], water adulterating in milk is researched. Since India is a growing and a developing country. It stands 2nd after China in population and here the consumption of milk is more. Here generally the milkman in lower primary industries mixes water in milk though it is not that harmful than urea and ammonia. But this process is also not doing justice with the health of people. The system uses optical method to check the level of mixing of water in the milk. Since, different animal milk has different contents or levels of fat in it. In India consumption of cow and buffalo milk is more followed by goat, sheep and camel. The paper suggest that average fat contain of the milk is 3.6%-4.8% and Buffalo milk is more heavy and fat contain is more it is near to 6.4%.The fat contain and the grade of milk differ animal to animal and place to place.

The framework [4], Authors explain about financial performance of milk producing co-operative society in Valsad, Gujarat. Gujarat is amount the top producers of milk in India and also processes of milk is also carried here in large scale. It discuss about the profit and loss accounts and balance sheet of milk producing cooperative society. It talks about gross profit and net profit ratio. Basically it helps us to know how the industry of milk is handling the capital, budget and finance.

In reference [5] Author says, India being one of developing country where agriculture is backbone of economics. The employment given by agriculture is 50% but the condition of farmers is hilarious. The farmers are not so wealthy and also the facilities given to them are less. So there is need to have some side business for betterment. Dairy industry gives the way to come out from unfavourable conditions. The paper pinpoints the advantages of dairy industry in agriculture. The main goal of the paper is to quest milk production, to figure out adaption of dairy, to figure out complications etc. India's most successful developmental activity is highlighted as a Dairy industry.

In reference [6] article gives the information about an instrument pH meter or pH probe by Hanna Instrument. pH helps to detect the nature of liquid, adulteration, atrophy and signs of mastitis contagion. Other compositional changes can be checked using pH. The pH value 6.7 indicates pure milk apart from any pollutants or adulteration. When pH value falls below 6.7 it termed as acidic which also indicate the bacterial demotion. When pH value comes near acidic pH value the curdling process starts, and results in a sour test and smell. When pH value is more than 6.7 it is termed as basic or alkaline. The milk from cows suffering from mastitis indicates the basic pH value. The different milk products required different pH of milk therefore it is must to have a check of ph.

Of Reference [7] we did a literature review of the Indian Dairy Industry. The fundamental aim of this article is to recognize the state is dairy and collaborators in this field. 24 articles showing data of various states out of which 14 articles based on foremost data collected from farmers. The cooperative and private dairy plants, cooperative alliance are the mains on which rest studies are based. Deficiency, inadequacy of veterinary, improper information and technical awareness are some the leading problems exposed. The ' Operation Flood ' reflects the powerfully effect of government and farmers. Also it makes India hold the position of world's largest milk producing country.

Reference [8] is a Manual of methods of analysis of food, food safety and standards authority of India ministry of health and family welfare government of India, New Delhi 2015 of volume 5 2465.All the standards of the Buffalo milk, cow milk, goat milk, sheep milk, mixed milk, standardised milk, full cream milk, recombined milk, toned milk, double

toned milk, and skimmed milk as laid down under FSSAI Rules.

In reference [9] Authors have developed a system that detects the fat in milk using a photometric based sensor. In last year there is consequential growth in production of milk. The information given in this paper shows the use of embedded system in Dairy Industry. The use of embedded system is spreading rapidly. Embedded technology now is leading and the knowledge available is huge. A combination of hardware and software designed to perform particular application known as embedded system. Though the embedded system is invisible but it contributes a lot in our day to day life. This paper construe one of the application of embedded system named as MILKOTESTER. It is a unit device with minimal power usage, firm which monitor different guidelines of milk.

In reference [10], is the study and research of 'Dairy Farms: Mechanization, Automation, and Robotization'. It states that the Buildings and structural equipment on a dairy farm makes the job of caring for the animals easy and convenient. Various types and combinations of buildings and equipment are appropriate for different styles of management. Mechanization, Automation, and robotization are the keys technology in dairy industry. In this paper the feeding systems, watering systems, milking systems, and manure handling are monitored concentrating on the mechanical and engineering means.

Next survey done is about the real time machine used for milk fat detection named 'Electronic Milk Tester'. Electronic Milk Tester manufactured by REIL is used for measuring the fat content in milk accurately and digitally. It works on the principle of Photometric measurement of light scattered by the fat globules present in the milk sample. The measuring procedure follows the conventional system of dilution, mixing homogenisation and photometric measure. It performs 120-150 samples per hour. It measures up to 13% Fat. It has close correlation to accepted standard methods. It costs approximately Rs.25, 000.

Another real time product for milk parameter monitoring is 'Ultrasonic Electronic Milk Analyser'. It is Microprocessor based state-of art technology. The system Measures Fat and SNF content in milk .It works on the principle of Ultrasonic. The signals allowed to pass through the sample are measured digitally for accurate display. The system is suitable for measuring Raw, Fresh and homogenized milk. It performs 55-60 tests per hour. This system is also capable of measuring other milk parameters like Density Protein, Lactose Milk Sample Temp, Added water Salts, Freezing point, Total solids pH, Conductivity. This system costs of Rs.33, 000.

III. METHODOLOGY

Sensors:

1. **Fat Sensor –** The milk sample of which fat content is to be measured is placed the test tube. On Both right and left side of the test tube, LDR and Power LED is placed respectively. The LDR will detect the light coming out of milk sample after projecting the Power LED's light on it. LDR will give out voltage output which will be converted into equivalent Fat percentage.

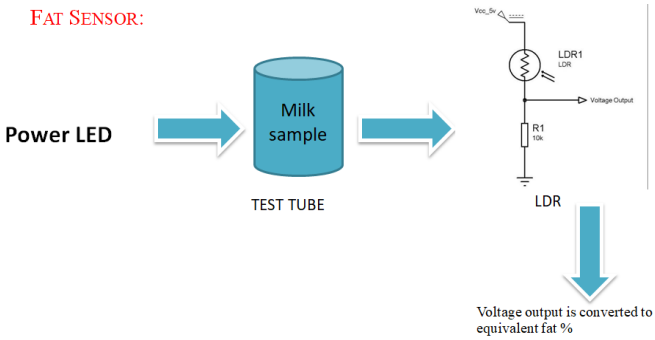

Figure 1, fat Sensor

2.Load cell - We are using load cell to measure the weight of the weight. A load cell is a transducer that is used to convert a force into electrical signal. The output of this load cell will indicate the weight of milk.

Figure 2, Load Cell

3. pH Sensor -pH sensor is used to measure the pH level of the milk. This pH Probe can be fully submerged in to the milk sample, up to the BNC connector indefinitely.

Figure 3, pH Sensor

IV. PROPOSED SYSTEM

The system measures the milk parameters from the unit milk sample kept in the test tube. After putting milk in container, the fat sensor will measure accurate fat content of milk and the pH sensor will measure pH of milk and provide this information to ARM controller. Fat contents and pH of milk will also be display on LCD. Load cell will measure weight of milk and provide this information to ARM controller also it will be display on 16x2 LCD. Arm controller collect data from fat sensor, pH sensor and load cell, LCD will display this information with farmer's name. Upon measuring all the milk parameters the system will Send SMS specifying all the milk parameters details to the particular milk supplier and system will upload this same data on Web Page of the dairy.

Figure 4, Block Diagram

V. RESULTS AND DISCUSSION

1. System will display fat contents of milk.
2. System will display pH level of milk, weight of milk.
3. System will display type of milk. (like cow's milk, buffalo milk ,etc.)
4. System will send message to the farmer stating the milk parameters.

Table 1, Observations

Milk Sample	pH Observed	Fat Observed (%,m/m)	Fat as printed on package of milk sample.
1.Sample A(Buffalo)	6.7	13	13
2.Sample B(Cow)	6.5	8	8.2
3.Sample C(Buffalo)	6.7	13.5	13
4. Sample D(Cow)	6.6	8.7	8.5
5. Tonned Milk	6.7	13	12.7
6..Milk from Milkman	6.9	13.1	-

Table 2, Observation of load cell readings.

Sample Taken	Actual Weight	Observed weight (measured by load cell)
1.Sample A	500 ml	498 ml
2.Sample B	1 lit.	1.01 lit
3.Sample C	15 lit	15 lit
4. Sample D	100 ml	98.9 ml
5. Sample E	5 lit	5 lit

Figure 5, LCD display of system displaying all measured milk parameters.

Figure 6, Actual system Image

VI. CONCLUSION AND FUTURE SCOPE

The system being developed is used to test fat, pH and weight of the milk sample from the different milk supplied by milk suppliers. Further research in this area may be carried out to increase the sensitivity of the instrument by estimating the effects of external factors. Change in temperature, atmospheric pressure and also, residual pressure exerted by the stray gases present in the sample that affects the performance of the sensor can thus be minimized. This system will help to maintain the quality of the milk at its best.

In future, this system with some more system additions can be used for measuring other milk parameters like Density Protein, Lactose, Milk Sample Temp, Added water Salts,

Freezing point, Total solids pH, Conductivity which will help dairy plants to fix the milk rate. This system will be able to give accurate results in low budget as compared to heavy budget system to the dairy industry.

REFERENCES

[1] Prof. Santosh M. Tambe1, Prof. Mahindra R.Gaikar, Prof. Snehal S. Somwanshi,"The detection of Urea, Sugar, Sodium Chloride, and Measurement of PH Parameter in the Milk",Vol. 5, Issue 3, March 2016.

[2] Dr. K.B.Ramesh1, Khushboo K Gandhi, Pooja Valecha, Shradda Pai K, Sushma M5,"Quantification of Urea in Milk- A review of Existing Methods", International Journal of Engineering Research and General Science Volume 3, Issue 2, March-April, 2015,ISSN 2091-2730.

[3]Kejal Shah1, Rajeshri Kelkar, Amruta Sarda1, M.S.Chavan,"PERFORMANCE AND ANALYSIS OF WATER ADULTERATION IN MILK USING LIGHT SENSING SYSTEM", International Journal of Pure and Applied Mathematics ,Volume 118 No. 22 2018, 1097-1102

[4] Patel Dilip Kumar,Patel Alkaben,"Financial Performance of Milk Producing CO-Operative society in valsad district",VOL.2,issue 4,April 2014,1-6.

[5] Ms.Humera Quazi,"A Study of Dairy Industry in India".- http://gsw.shikshamandal.org/wp-content/uploads/2015/10/A_STUDY_OF_DAIRY_INDUSTRY_IN_INDIA.pdf

[6] "pH/Temperature meter for milk" - with Application Specific probe.- https://www.mediray.co.nz/media/15606/ds_hanna_ph_ha-hi99162_1p0_0415.pdf

[7] Bhagyashree S.Kunte,Prof.Sanjay Patankar,"A literature review of Indian Dairy Industry",IJMRR,June2015,Vol.5,issue 6,Article No.2,341-350.

[8] "MANUAL OF METHODS OF ANALYSIS OF FOODS FOOD SAFETY AND STANDARDS AUTHORITY OF INDIA MINISTRY OF HEALTH AND FAMILY WELFARE GOVERNMENT OF INDIA NEW DELHI 2015",Vol 5,2465.

[9] Kejal Shah,Rajeshri Kelkar,et.al "Photometric Based Sensor For Fat Detection in Fresh Milk",Vol.3,issue 4,April 2015.

[10] DR.SC.M.SAMER ,"DAIRY FARMS:MECHANIZATION ,AUTOMATION AND ROBOTIZATION".

[11] http://www.reildairy.com/Forms/EMT.aspx

[12] HTTP://WWW.REILDAIRY.COM/PDF/UMA.PDF -RAJASTHAN ELECTRONICS AND INSTRUMENTS LTD.

Authors Profile

Mitali Sirdeshpande is completing her B.E in Electronics and Telecommunication from AISSMS Institute of Information Technology, Pune. She was a student member of Indian Society for Technical Education in 2015-2016.Her area of interest includes embedded systems and Image processing.

Sofiya Shikalgar is completing her B.E in Electronics and Telecommunication from AISSMS Institute of Information Technology, Pune. She was a student member of Indian Society for Technical Education in 2015-2016.Her area of interest includes embedded systems and Image processing.

Ms.Vijeta Vipin persuing B.E. from AISSMS's Institute of Information Technology,Pune in 2019. She is currently a student in Department of Electronics and Telecommunication and persuing Engineering from AISSMS's Institute of Information Technology Pune since 2015. She is a student member of IEEE since 2015.She was also student member of ISTE for a year (2015-2016).She is doing research on the dairy farming system since 2018.

Vinayak Bairagi has completed PhD degree in Engineering from Pune University. He has teaching experience of 12 years and research experience of 8 years. He has filed 9 patents and 5 copyrights in technical field. He has published more than 58 papers, of which 26 papers are in International journals of which 12 papers in SCI Indexed journals, with five Springer journal publications along with One in The IET journal publication. He is a reviewer for nine scientific journals including IEEE Transactions, The-IET Journal, and Springer Journals. He is the P.I. for UoP-BUCD research grant. He has received "Maniratna" Best Teacher Award for Excellent academic Performance (2013). He is recognized PhD Guide in Electronics engineering of Savitribai Phule Pune University

