ARM Based Temperature Monitoring and Control for Milk Pasteurization

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Abstract: The temperature monitor and control is most important of dairy products industry. The paper proposed a monitoring of temperature and control by using ARM processor. In this proposed methodology is designed and implemented by using embedded system and it monitor and control the temperature, when the temperature exceeds from predefined limits then the valve is closed automatically. This system provides more flexible accurates to monitor and control the temperature in dairy products and it is also provide effective for rectification of faults if any abnormality occurs in dairy plants by using embedded controller.

Keywords: **ARM processors, sensor, open /close valve, LabVIEW.**

I. INTRODUCTION

The Pasteurization is one of the most important processes in the treatment of milk and other dairy Products. When carried out correctly, these milk pasteurization processes give longer life and Pasteur discovered that heating milk to a high temperature then swiftly cooling it before bottling it, enabled the milk to remain fresher for an extended period of time. Today the process of pasteurization is widely used in the drinks and food industries. But this process slowly spoils caused by microbial growth. Unlike sterilization, pasteurization is not intended to kill all micro-organisms in the food. Instead, it aims to reduce the number of viable pathogens so they are unlikely to cause disease (assuming the pasteurized product is stored as indicated and is consumed before its expiry date).Commercial-scale sterilization of food is not common because it adversely affects the taste and quality of the product. Certain foods, such as dairy products, may be superheated to ensure pathogenic microbes are destroyed.

Pasteurization means treatment according to one of the following methods:

The holding method – milk or milk product is rapidly heated but the temperature is not less than 63ºC and not more than 66ºC, it retained at that temperature for not less than 30 minutes.

(A)Immediately and rapidly reduced to 5 ºC or less in the case of milk and milk products other and then cream also reduced to 7ºC or less in the case of cream.
(B) Maintained at below that temperature until the milk or milk product is removed from the premises for delivery.
The high-temperature short time method – milk and milk product is rapidly heated at a temperature of not less than 72ºC, retained at that temperature not less than 15 seconds, and then chilled according to (A) and (B) above.

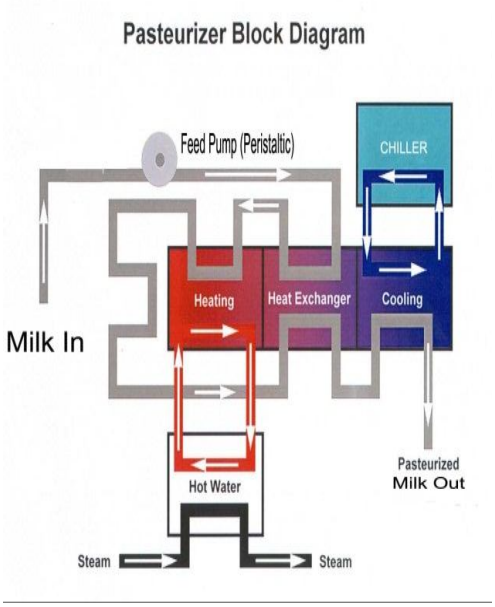

Figure-1: Pasteurizer process block diagram

II.LITERATURE SURVEY

The dairy industry is in needed for cost-effective, highly reliable, very accurate, and fast measurement system to monitor the quality of dairy products. This is describes the design and fabrication works undertaken to develop such a system. The techniques used center around planar Electromagnetic sensors operating with radio frequency excitation. Computer-aided computation, being

fast, facilitates on-line monitoring of the quality [1].

The two main reasons for increases the efficient and profit of the in producers sick, both of which have to some degree been influenced by information technology. The appropriate information technology described in this helped to make information symmetric in the market, thereby minimizing problems of adverse selection and tedious work.

It is the only reason automation has been introduced into the agriculture recently. In many dairy ARM processor s, computer aided control of physiological and sanitary parameters are already used and lead to a productivity increase and the eliminated the some tedious operations. Embedded Technology is now in its prime and the wealth 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 day to day life, even though they might not necessarily be visible [2][3].

For Water-Bath system, it is necessary to the attain desired temperature within a specified period of time to avoid the overshoot and absolute error, with better temperature tracking capability, else the process is disturbed. Water-Bath temperature control is one of the most important and widely used applications of non-linear control system in process if control industry and its applications, In the production of a variety of drinks products such as chocolate drink, strawberry milk products etc. The process industries which use Water-Bath temperature control are Nestle, Yeoh Hiop Seng, F&N, etc. If the temperature is out of the given range, the final product is badly affected [4][5].

Perishable goods could be monitored while they are in transit to check that they are not subject to unsafe temperatures, and fragile goods could be monitored to detect unsafe accelerations that may cause breakage. Other applications include the detection of ARM processor full agents and non-invasive biomedical monitoring [6].

With the initiatives of National Dairy Development Board (NDDB), out of 70,000 dairy cooperative societies in the country, around 26000 are using Electronic Milk-Testers (EMT) and around 2500 are using the PC connected electronic milk-tester machines (known as Automatic Milk Collection Systems - AMCS). These systems introduced very satisfactory milk collection methods and facilitated immediate payments to ARM processor based on the quality and quantity of milk delivered [7].

Beekeeping is a production branch of the agriculture. Honeybees are very important economical insects not only for pollination of crops, but also for their valuable products. Bees are gathering nectar and pollen from plants and trees. A part of it bees are using to maintain their own life, but the other part is used for production of beekeeping products, like wax, propolis, queen milk, bee venom, apilarnil, etc. These products are used either directly as human food (honey) or as a raw material for an impressive number of medicinal, cosmetic, pastry produces, etc.[8][9].

The inspection and evaluation of the System properties are carried out without destroying them. The use of the planar sensors has been extended to inspection of metal and electroplated materials [10].

III.BLOCK DIAGRAM

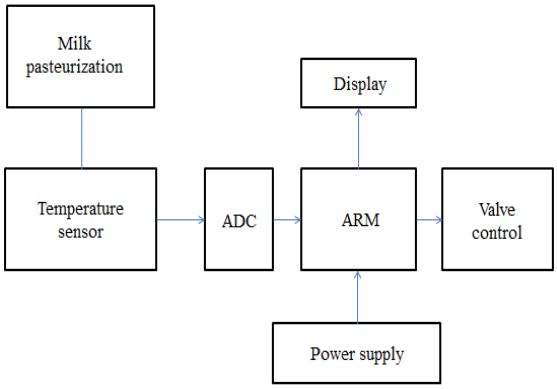

Figure-2: Proposed Block diagram

Description of proposed method:

The dairy products from pasteurized and unpasteurized milk, the very small quantity of dairy products available in which are unpasteurized. It means that the risk of foodborne disease from such a product is comparatively high. When disease occurs following consumption of a product made from pasteurized milk, it is almost invariably the result of post pasteurization contamination or failure of the pasteurization process. Alternatively the pasteurization using lesser heat treatments, which are seen as desirable because of improved organoleptic qualities imparted to cheese and other dairy products do not by definition, give the same level of protection against foodborne diseases. Assessment of the risk posed by such alternative treatments will need to be made on a case-by-case basis.

The operations carried out the temperature monitoring and control effectively through an ARM processor LPC2148kit. The temperature is measured by using temperature sensor and it passed to the signal conditioning unit where filtering and amplifying is done in this process. All the frequency spectrum contains not valid data as specified so in order to neglect or filtering the unwanted data or signal by using filter.

The Amplifying helps in improving the resolution of input signal and also to increase the signal to noise ratio. The signals are passed to the ARM

processor. All the analog signals are converted into digital signals by the ADC.The measured value and reference value are compared by using ARM processor where the measured value is exceeds from set value then the valve is closed automatically.

This sensing technique has been potential to be successfully employed in the quality inspection of dairy products such as milk, butter, cheese, curd, and yogurt. The objective of this proposed methodology is to design and develop the dairy product quality with high performance, low cost and real time smart sensing system for control the temperature through ARM processor.

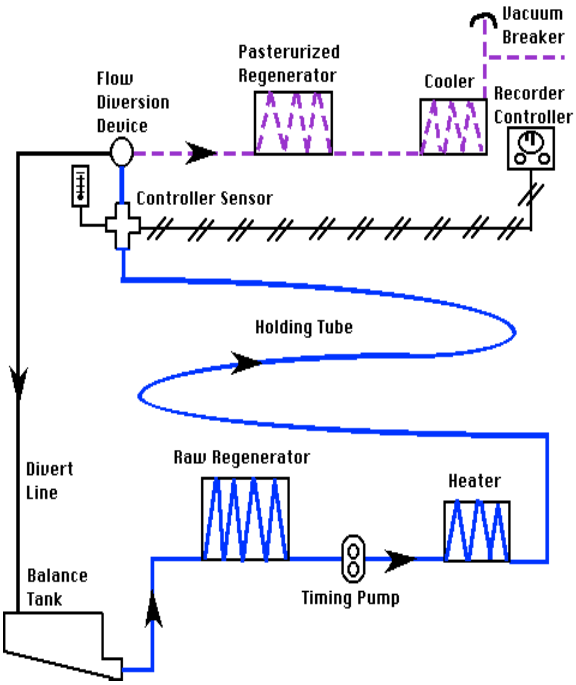

Figure-3: Milk Flow Diagram

IV. SOFTWARE IMPLEMENTATION

The proposed system has been implemented using LabVIEW development tools are used to monitoring and control the applications in evolving according to the software architecture. The server is responsible for data acquisition and data storing in memory. The server application reads the data from USB port and the ARM processor. The client application uses the data base actualized by the server in the order to realize the system. It consists of event list, warnings lists, ARM processor lists, and graphical parameter and measurement parameters.

A.Flow chart:

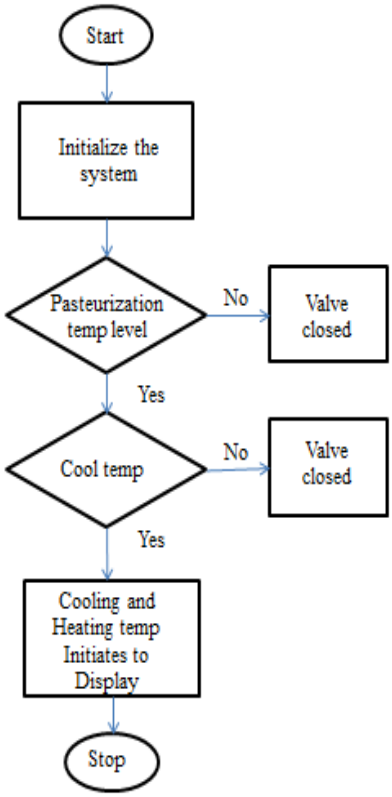

Figure-4: Flow Chart

B.Simulation results

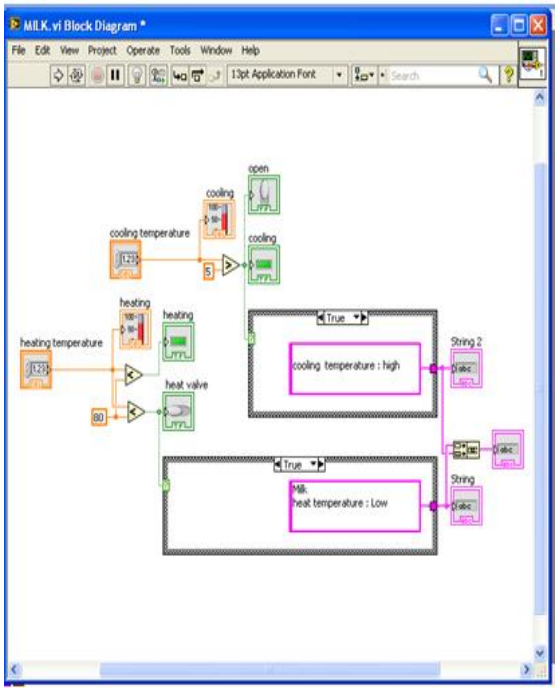

Fig: 5 Block diagram window

Front panel window

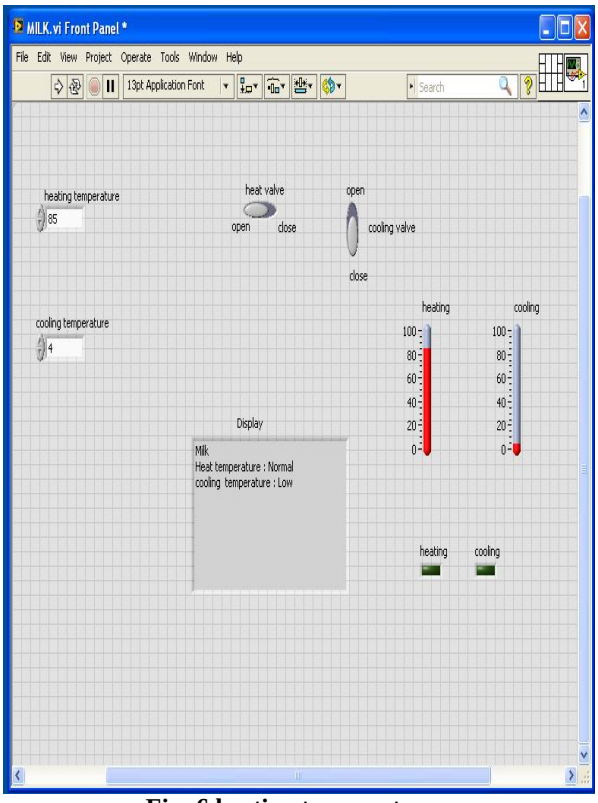

Fig: 6 heating temperature

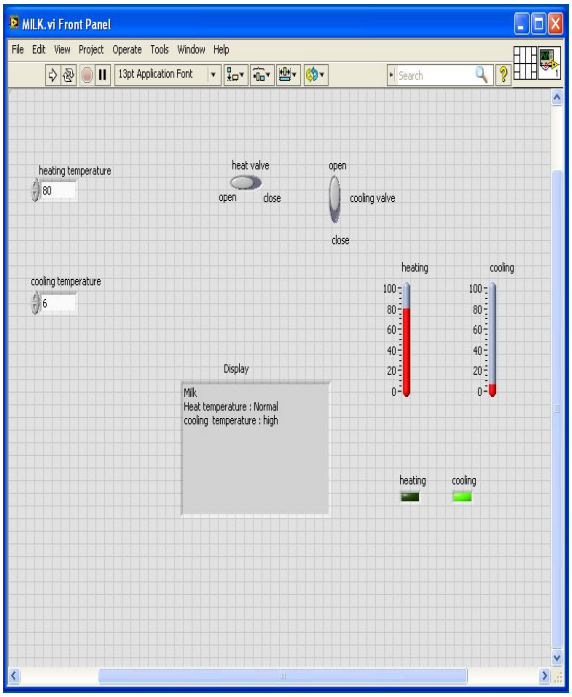

Fig: 7 cooling temperature

V. CONCLUSION

The dairy products made from pasteurized and unpasteurized milk, the very small quantity of dairy products available which are unpasteurized means that the risk of foodborne disease from such products is comparatively high. When the disease occurs following consumption of a product made from pasteurized milk it also invariably temperature variation. The reported investigation has opened up a very good possibility of incorporating the technique into the dairy industry. By monitoring the quality of the product, the proposed automatic valve system would be able to contribute to the improvements of the production process and waste reduction as well.

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