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Identification and Analysis of infection information in Dairy Products using Electronics Modeling

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Abstract-In human life, milk and milk products are important, necessary and vital food element without which the daily meal is not completed. Milk borne disease is caused by consuming contaminated milk products. Rapid pathogens detection is an urgent necessity in order to ascertain contamination and diseases caused by pathogens. The prime intention of this research was to developed electronics model to study the behavior of infection which are widely occur in milk .This research is used to design an electronics models for the detection of infection. Highly efficient pathogen separation, extraction strategies are needed to achieve successful detection of infection. Therefore electronic system has proposed which is used to study infection information, infection trajectories and its extraction in milk and milk product. The quality of the milk samples is tested by checking the pH level by using the electronics ph model.

The response of sensor system is compared with the response of the same sample in the dairy form. The result of this analysis is used to analysis the milk product and predict the infection present in food.

Keywords*:* milk infection; pH value; milk; IR sensor; contamination; milk safety

I.INTRODUCTION

Food and milk borne diseases are a worldwide growing health problem involving a wide spectrum of illnesses caused by microbial, viral, parasitic or chemical contamination of food. Risk assessment and public health control measure could be greatly enhanced by establishing an accurate relationship between ingested dose and infection probability and defining minimum infection doses.

Although the safety of food has dramatically improved overall, the progress is uneven and food borne outbreaks from microbial contamination, chemicals and toxins are common in many countries. Food and Drug Administration (FDA) developed a comprehensive 'Food Protection Plan', in which it was outlined that food must be considered as a potential vehicle for intentional contamination.

This model should consider the discrete nature of impurities and should be based on the concept of infection which varies in population with respect to initial stage. The rapid detection and identification of infection in milk product is a preliminary issue in fields of monitoring of milk-safety. As milk infection is a growing cause for human illness and death. There is continually increasing demands to maintain the safe milk supply. The quality of milk is essential component for the survival of living beings on earth. As The infection of milk increases depending on the number of parameters such as life of milk, the atmospheric condition of the milk storage, ingredients used in the manufacturing processing of milk, and most important is the actual initial condition of the milk.

In this research, the known milk samples are used as initial dose to the system. The performance and behavioral parameters are varied under the different testing condition, with respect the time and also with the pH value.

The model system is designed to detect the impurity, analyze the behavior of infection with respect to time. The response of sensor system is compare with the response of the same sample in the dairy form. The result of this analysis is used to study the milk and predict the different parameters of testing material. This model is used to compare the behavioral response of infection in milk, so that the milk safety is maintained.

II.OBJECTIVE OF RESEARCH

As the milk is the basic food material, so this research work is carried out to study the infection behaviour in various milk samples using infrared signal and by measuring the pH value. The milk samples are tested with respect to time and analyze the increase in population of bacteria, various types of contamination in milk product. This work is used to achieve the quality testing of milk and milk material.

III. MATERIALS

The number of milk samples are tested e.g. Amul Taja Milk +RST,Amul Taja Milk +STI,Amul Taja Milk +CHN,Raw Cow Milk,Amul Taja Curd,Home made Curd etc.This samples kept at different atmospheric condition i.e. at 0^0 Celsius , 20^0 Celsius, 40^0 Celsius, 60^0 Celsius, 80^0 Celsius, 100^0 Celsius etc for seven days of a week.

IV. METHODOLOGY

A.IR Sensing Model for Detection Technology

Fig.1. Experimental setup of IR sensing Model

Fig.2. Block Diagram of IR sensing Model

This model is designed to analyze the behavior of infection by varying the input frequencies.

- Function Generator: It is used to provide the various ranges of frequencies which are necessary to study the behavior of infection in milk material.
- Infra Red Transmitter Section and Infrared receiver Section:

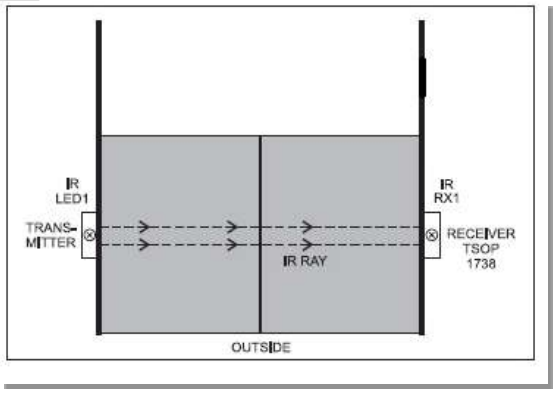

Fig. 3. Mounting arrangement for transmitter and receiver units

- This infrared transmitter is intended for use with this infrared receiver. The circuit comprises a transmitter unit and a receiver unit, which are mounted face to face on the opposite pillars of the gate such that the IR beam gets passing through it. The transmitter and receiver units are aligned such that the IR beam falls directly on the IR sensor. The 100µF capacitor (C1) is used to reduce ripples in the power supply.

- Milk sample under test: In the experimentation six samples was take under testing. Out of these only two samples consider here for testing and analyze the behavior of infection. First sample is the Amul Taza milk containing RST and the second sample is the raw milk i.e. fresh cow milk. The testing sample always placed in between the IR transmitter and IR receiver Assembly such that the transmitted IR signal directly penetrates through the milk sample. The receiver unit collects the transmitted signal which is plotted on the Digital Signal Oscilloscope.
- Digital Signal Oscilloscope: It is used to plot the received signal at various range of frequency.

B. EXPERIMENTAL SETUP FOR PH TESTING

In this project, the pH sensor system that provides a direct and convenient means to monitor milk quality to address food safety and waste issues. Here system of pH sensor is designed with microcontroller, which would receive the data signals from sensor for that we have to place the sensor in the surface of the food material to sense the pH level. The status will be sent through zigbee transceiver to the PC section which connected with the zigbee . This analysis of milk is used to maintain the safety of milk in milk industries.

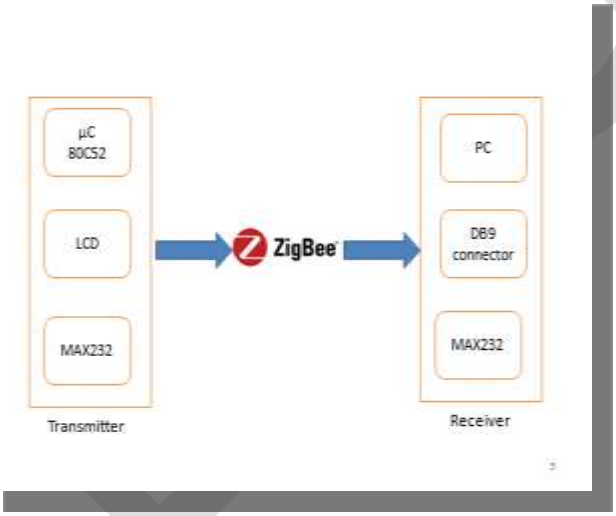

Fig.5. Block diagram of pH resting model

a) Experimental Setup

- The hardware setup is designed by using measurement panel, sensing panel, and Control panel and display unit.
- A pH measurement loop is made up of three components, the pH sensor, which includes a measuring electrode, a reference electrode, and a temperature sensor; a preamplifier; and an analyzer or transmitter. The reference electrode provides a stable potential against which the measuring electrode can be compared.
- The humidity sensor is made of a film usually made of either glass or ceramics. The material which is generally insulator absorbs the liquidis made out of a polymer which takes in and releases water based on the relative humidity of the given material. This phenomenon is used to changes the level of charge in the capacitor of the on board electrical circuit. These modules convert the relative humidity to the respective output voltage.

Fig.6. Experimental Setup of pH resting model

C. OUTPUT RESPONSE OF PH TESTING MODEL

The milk sample is checked under the different atmospheric condition. The impurity is added in the testing material to analyze at the different interval of time of a day and day of a a week. The increase in atmospheric condition of milk sample, increases the pH value response. As the sample kept by changing the atmospheric condition, after 24 hours the bacteria population increases, so that pH level decreases.

TABLE I:pH value of sample

Sr.No.	Milk Sample	Days	pH Value
1	Amul Taja Milk+RST	Day 1	6.12
		Day 2	5.47
		Day 3	4.89
		Day 4	4.3
2	Raw Cow milk	Day 1	6.84
		Day 2	5.82
		Day 3	4.83
		Day 4	4.08

E. DETECTION TECHNOLOGY IN DAIRY FORM:

To process the milk product,the contamination checking and population of bacteria counting in the milk product is the necessary steps in the milk manufacturing process.So that the milk is either consumable or non consumable is decided and passes for the further process.

This basic experiment of infection detction and extraction technology mainly consists of following two process.

1.Contamination testing in milk sample

2.Bacteria population counting

The following various steps are needed to check the above two test.

a) Dilution process: In dilution process, 9ml sample of each milk sample used for testing was prepared. Here we has considered the two sample of milk ,1st Amul Taja milk +RST,2nd Cow raw milk.
b) Agar preparation :Two types of Agar solution was prepared for contamination testing and bacteria population counting.First Agar of VRB(8.4gm)+Tergital-7(0.2ml) for Contamination testing in milk sample(Red solution) and SPC Agar for Bacteria population counting(yellow solution)
c) Heating the sample upto boiling point.
d) Preparation of sample for testing the contamination and bacteria population.

F. ANALYSIS OF MILK SAMPLE

Prepared sample keep in the laboratory for the 24 hours and after that the result was collected and recorded for the comparative testing of the various samples with IR system response.

Sample 1: Sample Amul Taja +RST

Fig.7.Contamination not present

Fig.8.50*10^4 Clooney/gm

Sample 2: Sample Cow Milk

Fig.9. Contamination (Coli form bacteria) present

Fig.10.40*10^4 Clooney/gm

In the first testing, as the both sample prepared by using the same steps which was required for sample testing. In both the sample, the lactic acid bacteria population was counted which decided either the milk in safety range or the milk exceed the consumable range.

Second testing is used to check that the milk is contaminated by the infection or not. In this experiment, the 2nd sample i. e. Cow milk contains the coli form bacteria which is harmful to human beings**.**

V. CONCLUSION

This research work is used to study the behaviour of infection in milk by analyzing the IR system output and by checking the pH value of sample under test.

As number of sample are tested by using both the method for number of days, the pH value response of the sample decreases with respect to time. Similarly the IR system response increases with respect to number of days increasing. This IR sensor model is very beneficial for the society in various application of milk processing.

The response of the system are compared with the response of the same sample in laboratory .The Second sample is contaminated and there are E.Coli bacteria occurs.

VI. LIMITATIONS

As the research is to be in continuation, so there is no such limitations can occur in the designing of the electronics model.

VII. JUSTIFICATION OF RESEARCH

Milk and milk product is the main potential vehicle for health of human beings. Asmilk safety is a global health goal and the milk infection take a major crisis on human health. So the system is required to test the quality of milk material. This electronics model is used to analyze the infection behaviour, generation and regeneration in the milk and milk products.

VIII. FUTURE SCOPE

As the milk safety is prime requirement of society, portable and cheaper system is required to test the quality of food materials.

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