

# Performance Analysis of Iot Based Smart Milk Dairy System

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**Abstract-** In the present structure of dairy industries, many systems are adopted for the collection and analysis of raw Milk. Measurements are done for the analysis of raw milk such as milk, quantity, quality, and adulteration. Basically raw milk test is performed using chemical method, centrifuge method, and dairy electronics gadgets. The chemical test and centrifuge test is the hard, lengthy and hazardous process. So it is necessary to build the IoT handheld Dairy Industry System. Dairy Industries are using IOT based system for making the easy and precise measurement in quality control.

In proposed system, architecture of the smart milk dairy is proposed, which analyzes the aspects of the different layers such as physical resource layer, the network layer, cyber technology etc. for parameter analysis. This Proposed system provides big Data, Cloud, and data analytics solutions.

**Keywords-** Smart Milk Dairy, IOT, Raw Milk Analysis, Data analytics

## I. INTRODUCTION

The Internet of things (IoT) is a network of material devices, dynamic global interconnected network consisting of Internet-connected objects. The Internet of Things will connect everything with everyone in an integrated global network communications and automated system for straight combination of the computer-based organization, and resultant in enhanced effectiveness, correctness and financial advantage in calculation to compressed without human interference. The IOT base instruments enclose with electronics, software, sensors, actuators, and system connectivity which allow data is transferred through Wi-Fi. In Digital IOT base industries includes Physical terminal, Network terminal layer, Data transmission and receiver techniques and cloud computing [2]. The Raw milk analysis is essential part in milk industries because in raw milk having immediately spoilage process. The Milk is a perishable product. The collection of milk is a twice a day and the system is commonly utilized Two to three hours. The milk collection, analysis, processing distribution in market from farmer of dairy Societies to milk plants is chain system.

To avoid this system there is a need of IOT base digital system and follow conducts the purity of the milk. The most important issue many old systems are analyse microbial activity, Milk parameter etc. So to measure the purity of milk is essential and also important because adulteration in milk is hazardous risk in human health.

## II. LITERATURE REVIEW

Dr. G. Rajakumar, et al [1] developed a IOT base milk analysis and milk adulteration. The outcomes is analysis of quantity and quality of milk using sensor also microbial contents determined by gas sensor

BAOTONG CHEN, et al [2] develop a proposed methodology of physical and cyber technology and also including of IOT, big-data, cloud computing etc. The outcomes is the develop a smart digital industries.

LucasdeSouzaRibeiroet.al.[4]states that analysis of water adulteration in milk using cryoscope the GaAsSb sensors, which display fast process and better accuracy to the NIR range and need to analyse broadcast reflected light. The milk sample tested on this equipment demonstrated on water mixed in milk

Pallavi Gupta et. Al [7] search new technology of anhydrous milk fat and adulteration of clarified butterfat is analyse using opto electro mechanical sensor. The result is in clarified butter near about 1/4th of animal fat is simply analyse adulteration. Dari de O. Togninho Filho et.al [5] present microcontrolled based digital photometer which adopts three LEDs with radiates in the NIR field and was established without use of lense, filters and variable parts. This instruments analyse the flow of IR emission through milk samples to estimate the addition of Water. The identification is equivalent to cryoscope and still rapid. Wesley Becari et.al [9] proposed a procedure for the analysis of bovine milk adulteration using electrical impedance measurements. The outcomes is the ak- nearest neighbors algorithm that allows to quantitatively qualify the samples of pure and adulterated milk. Anjali.R.Malali,et.al[10] this equipment is base on

embedded base and detecting the milk parameter using Conductivity and Density sensor. The outcomes is the reduce the size, price. Massimiliano De Luca et.al [11], is created current technology and found adulteration of milk and quality of milk using Ultrasound Technology. The outcomes is the characterization of milk with various quality. Aba Priev et.al [12] An ultrasonic Analyzer that utilizes radially wave PZT

### Working Process

Here, IoT based Raspberry pi 3 model is a piezoceramic tube and testing and controlling of raw milk quality. The outcomes is the quick analysis of milk parameter.

### III. PROPOSED SYSTEM

In many milk analysis technology I have study and seen the past system in Milk analysis parameter. So present current technology in detection of milk quality and adulteration using sensors. In this proposed IoT base smart milk dairy architecture, The main aspect display to the concern of milk parameter and adulteration .In the proposed architecture each farmer or client should provide card for accessing in milk dairy because each farmer or client should their own card number or code number. In this proposed architecture the milk parameter analyse from the various sensor these sensors are viscosity sensor, Temperature sensor. The gas sensor detects the microbial activity when milk stored long time. because milk is store long time started the microbial activity. The Stepper motor is connected in input stage because milk take from stepper motor and analysis all parameter. The LCD display is the output of this system and displaying the parameter of milk like Temperature, Fat, Density, Solid Not Fat (SNF ), Lactose, Protein, water and Salt.

In this proposed system input stage as a milk and then analysis of different parameter of milk and adulteration. This proposed system used in milk collection center as well as Dairy Industries. This system is new one current technology. Thus Milk composition analysis is acquisition of raw milk according to quality and production process of product quality control must be part of. Traditional milk component analysis is the use of chemical analysis techniques, requires each milk fat, solids, density, chemical analysis of protein content. single board computer The quad-core Raspberry Pi 3 is both faster and more capable than its predecessor. The Raspberry pi supports wireless internet out of the box, with built-in Wi-Fi and Bluetooth. The Raspberrypiisusedwhichcandriveby5V DC supply. Milk stored in milk tank is given to the sensor by using stepper motor

In stepper motor the peristaltic pump is use because the milk sample is taken from this stepper motor and this milk sample of flow rate will be accurate and there will not be any reverse flow or back flow from sensor. The peristaltic pump using stepper motor is free pumping mechanism and expected total flow volume of milk. The sensor read the input and convert it into Digital through Analog to digital converter. The RFID card show the farmer or client's detail through RFID reader. Thus the sensors signal transmitted from microcontroller and received to microcontroller. Aliquid crystal display is the key output interface, via the serial interface standard interface with the microcontroller. The entire process is control of sensors and microcontroller and IOT.

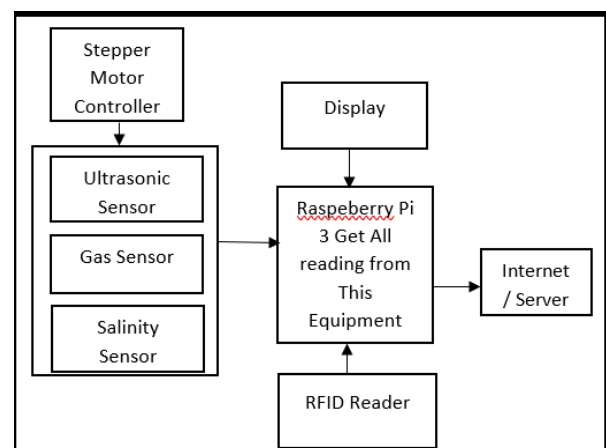


Figure 1 Proposed Architecture of Dairy Instrument

### Smart Milk Dairy Architecture

The Industry 4.0 is the reference of digital base smart factor and is exponentially growing technology and increase their competitiveness. In Industry4.0 represents huge opportunities in current direction for industries to integrate their customer's need and choice into their development and production process, with data sharing with their machinery. It is easier to analyse machine data, improve qualityandavoidsfaults.Inindustry4.0 is the intelligent manufacturing attracts huge interest from government, industries and academic scientist. So, the developments patterns of IOT base digital dairy industries are timely examined. Yet , the procedure for IOT base Digital milk dairy process still not define. In the process of digital base smart milk dairy, the IoT is proposed to additional source to this industries . In Industry 4.0. is the forthcoming revolution in industry will bespurred by the greater use of automation, data exchange, robotics and artificial intelligence. In digital base Milk dairy the data analysis and scientific decision are use to accomplish organising, instruments operations service and quality control of products. Next, the database is store through

Internet of things is introduced to constructive to the constructing system from a narrow database to the cloud . Over the human- machine cooperation, the international collaborative development of bright process adapt to the procedure- consumed market is built . Thus Digital milkdairyofindustry4.0mainlyshows these views these views are Network layer, process, combination and execution. The Fig. shows, the architecture of smart Digital milk dairy industries consists of four layers, these layers are layer of physical resource , network terminal, data application terminal, and terminal layer. How to transfer modern milk dairy into smart factory using this aim. How to study key technologies involved in all layers is detailed.

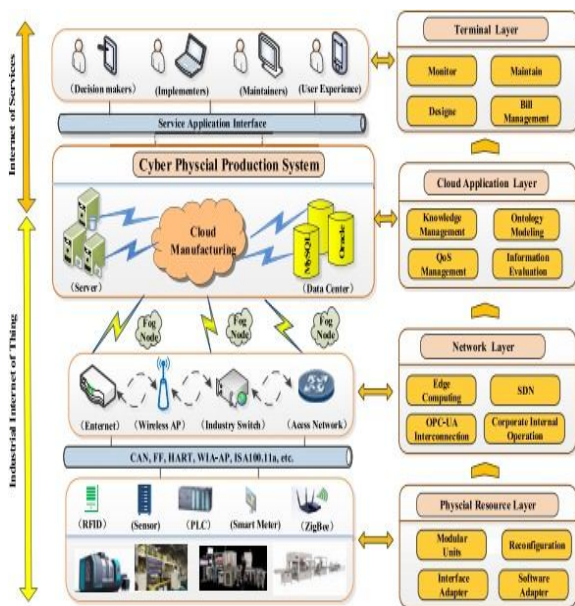


Figure 2 Hierarchical architecture of Smart Milk Dairy

**Proposed Methods and Simulations :-**

**Raspberry pi 3 B+ :-** Raspberry pi 3B+ is the latest model of Raspberry pi. It is a tiny credit card size computer and attach to the monitor , TV and also attach keyboard, mouse, power supply, and micro SD card and install Linux operating system

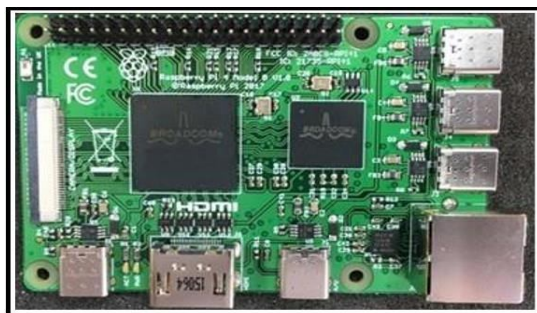


Fig.3 Raspberry pi 3 B+

**Ultrasonic Sensor :-** The Ultrasonic Sensors measure the quality of milk like FAT, SNF, Density, Water, Lactose, Protein, Salt and Temperature. This Ultrasonic Sensor is basically Piezoelectric transducer. This principle is based upon the ultrasonic cylindrical standing waves for continuous monitoring system . The ultrasonic Sensor is consists of Two separate piezoelectric transducer that one is the Transmitter and other is Receiver.

**Gas Sensor :-** The Urea detects in Raw milk using Gas sensor MQ135. This sensor is in Teflon sheet The property of ammonia is Teflon attracts the ammonia toward the Teflon sheet .this phenomenon generate the heat this heat sensed by MQ135 sensor which is proportional to the percentage of urea in milk change in temperature is converted in change in resistance of MQ135sensor.

**Salinity Sensor :-** Using salinity sensor to detect the mixing of salt in raw milk. The salinity sensor measure the conductivity of milk. Thus using salinity sensor detects salinities, from salty water to sea water, and even hyper-saline conditions.

**RFID Reader:-**The RFID reader reads the customer details. In this proposed architecture the customer information is stored in own card. First the customer access this card in milk dairy automation. The reader gives the details information is in quality, Quantity, and payment details

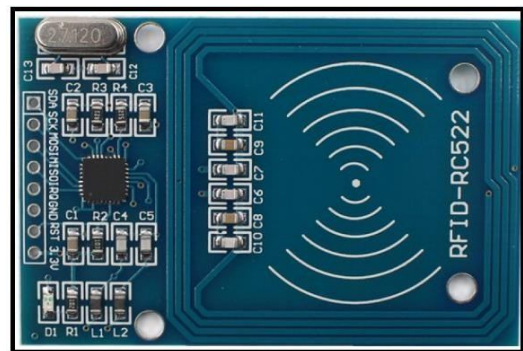


Fig.5 RFID Tags

**To evaluate performance of system mentioned in literature review there are several parameters that it should fulfill. These parameters are listed below**

- Measuring the level of Milk
- Finding Types of Milk
- Measure Water adulteration in Milk
- Monitoring the Temperature of The Milk
- Viscosity of Milk
- Measure the Salinity of the Milk

#### IV. CONCLUSION

This Proposed System concludes that the architecture is based on industry 4.0 application of cyber physical resource system. In this paper, system is proposed for detecting milk parameter and adulteration using sensors. Milk parameters such as Temperature, Fat, Snf, density and adulteration parameters such as water, Salt and Microbial activity are detected efficiently through this system. The Microbial activity is detected using gas sensors when milk is stored for long time. Various parameters for testing quality of milk will be stored in server using proposed method.

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